

GEO TIMES

Professional News Magazine



Nov.-Dec. 1959

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Published by the
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THE GEOCHEMISTRY OF RARE AND DISPERSED CHEMICAL ELEMENTS IN SOILS by A. P. Vinogradov

In the light of new data from the laboratories of the Vernadskii Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, USSR, the author has brought his work completely up to date—particularly with respect to physicochemical properties of individual rare elements, and to their occurrence and distribution in soils and rocks, as well as their role in the lives of plants, animals and humans.

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Methods of determination of rare and dispersed elements in soils . . . General geochemical regularities in distribution of rare elements . . . Boron, fluorine, bromine and iodine in soils . . . Lithium, rubidium and cesium in soils . . . Rare earths and yttrium . . . Vanadium, chromium, manganese, cobalt and nickel in soils . . . Radioactive elements in soils . . . Other dispersed elements in soils.

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Calendar

Cooperation of Society Secretaries in supplying meeting notices for *GEOTIMES* calendar is requested.

YOUR CALENDAR

The GeoTimes Calendar is your calendar. It carries notices of national and regional meetings and field trips when notices of these events are received through voluntary cooperation of the responsible organizations.

Completeness of the GeoTimes calendar is in the hands of the AGI Member Societies, the local societies and other groups sponsoring geological-geophysical meetings.

Notices for the calendar should be submitted in style conforming to that used in the GeoTimes Calendar in order to reduce editing required.

GeoTimes is published 8 times a year. Your notice must be in our hands at least one month before publication date. The closing dates are Feb. 1, March 1, April 1, June 1, Aug. 1, Sept. 1, Oct. 1, and Dec. 1.

GEOTIMES CALENDAR

Meeting notices for the GeoTimes Calendar should be submitted in concisely edited form to:

Mrs. Kathryn Lohman
GeoTimes Calendar Editor
2101 Constitution Ave., N.W.
Washington 25, D.C.

- Nov. 16-21, 1959—INTERNAT. ATOMIC ENERGY AGENCY, Conference on Disposal of Radioactive Waste, Monaco. Write: Agency, at Kaerntnering, Vienna 1, Austria.
- Nov. 16-21, 1959—ANTARCTIC SYMPOSIUM, Buenos Aires. Write: Rear Ad. Rodolfo N. Pansarini, Instituto Antartico Argentino, Cerrito 148, Buenos Aires.
- Dec. 4-5, 1959—NAGT: ANNUAL MEETING, Ohio State University, Columbus, Ohio.
- Dec. 12-13, 1959—OKLAHOMA ACAD. OF SCIENCE, Earth Science Sect., Ann. Mtg., Weatherford, Okla.
- Dec. 26-31, 1959—AAS: Ann. Mtg., Chicago.
- Jan. 11-13, 1960—FIRST INTERNAT. SYMPOSIUM on Arctic Geology, sponsored by Alberta Soc. of Petrol. Geologists; Calgary, Alta., Canada.
- Feb. 4-5, 1960—AGU: Pacific SW Regional Meeting, Los Angeles, Calif. Write: Vito A. Vanoni, Caltech, 1201 E. California St., Pasadena 4, Calif.
- Feb. 8-10, 1960—AAPG: Rocky Mountain Sect., 10th Ann. Meeting, Billings, Mont.
- Feb. 14-18, 1960—AIME: Ann. Mtg., Hotel Statler & Hotel McAlpin, New York, with SecG.
- Feb. 26, 1960—11th Ann. Symposium on Highway Geology, Florida State Univ., Tallahassee. Write: W. F. Tanner, Geol. Dept., FSU.
- Mar. 20-26, 1960—ACSM-ASP: Annual Meeting, Shoreham Hotel, Washington, D. C.

*Mar. 24-26, 1960—GSA: Southeastern Section meeting, sponsored jointly by Univ. of Kentucky Geol. Dept., Kentucky Geol. Survey, and Kentucky Geol. Soc., Lexington, Ky. Field trips (2) on third day. Write: Thomas G. Roberts, Dept. of Geol., Univ. of Ky., Lexington, Ky.

April 3-8, 1960—ENGINEERS JOINT COUNCIL, 6th Nuclear Congress, New York. Write: Council, 29 W. 39th St., New York 18.

*April 21-23, 1960—SEPM: Permian Basin Sect., Ann. Meeting, April 21, Abilene, Texas. Field conf. to study Pennsylvanian and L. Permian, April 22, 23. Write: J. P. Brand, Texas Tech. Coll., Lubbock.

April 24-28, 1960—ACerS: 62nd Annual Meeting, Bellevue-Stratford Hotel, Philadelphia.

April 25-27, 1960—CIM Ann. Mtg., Royal York Hotel, Toronto, Canada.

April 25-28, 1960—AAPG-SEPM: Ann. Mtg., Chalfonte-Hadden Hall, Atlantic City.

April 28-30—GSA: Rocky Mountain Sect. Regional Meeting, School of Mines & Tech., Rapid City, S. D.

April 28-30, 1960—AGU: 41st Ann. Meeting, Washington, D. C. This date is tentative.

May 2-3, 1960—AIME: SOC. PET. ENGRS., Wichita Falls, Texas.

May 5-6, 1960—AIME: Ann. Joint Meeting, Rocky Mountain Petr. Sects., Calgary, Alta.

*May 6-7, 1960—GSA: Cordilleran Sect., Vancouver, British Columbia. Field trips in SW British Columbia, May 5 and May 7-9.

May 25-28, 1960—AAPG: Western Canada Regional Meeting with Alberta Soc. of Petr. Geol. as host, Banff Springs Hotel, Banff, Alta.

July 25-Aug. 6, 1960—IUGG: General Assembly, Helsinki, Finland. Inquire: Sec. Gen. G. Laclavere, 30 Avenue Rapp, Paris 7, France.

*Aug. 6-12, 1960—19th INTERNATIONAL GEOGRAPHIC CONGRESS, General Assembly of the IGU and meetings of the IGU Commission, Stockholm, Sweden. Inquire: The International Geographic Congress Postfach Stockholm 6, Sweden.

Aug. 14-24, 1960—7th INTERNAT. CONGRESS OF SOIL SCIENCE, Madison, Wisc.

*Aug. 15-25, 1960—XXI INTERNATIONAL GEOLOGICAL CONGRESS, to be held at the Mineralogical Geological Museum of the University of Copenhagen in Denmark. Field trips before and after the meetings.

1959 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

Nov. 5-8—WEST TEXAS GEOLOGICAL SOCIETY, field trip to Val Verde Basin of Terrell, Pecos, and Val Verde Counties, Texas. Write: E. L. Dillon, Box 1609, Midland, Texas. Guidebook.

Recent Additions to the Committee of 1000 for AGI-1959*

C. Max Bauer	Carl A. Lamey
Fred Branden	Gordon B. Oakeshott
Lynn A. Brown	Hugh M. Roberts
Charles W. Collinson	Norman R. Rowlinson
Maurice Donnelly	A. L. Selig
James L. Dyson	Ruth A. M. Schmidt
Cornelius K. Ham	Edmund M. Spieker
James A. Haertlein	John S. Vhay
W. F. Jenks	

*For previous lists of members of the Committee of 1000 for AGI-1959, see *GeoTimes* Jan.-Feb., p. 22; March, p. 17, May-June, p. 11, July-August, p. 11, September, p. 18 and October, p. 3.



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This Month in GEOTIMES



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Robert C. Stephenson,
EDITOR

Kathryn Lohman
CIRCULATION MANAGER

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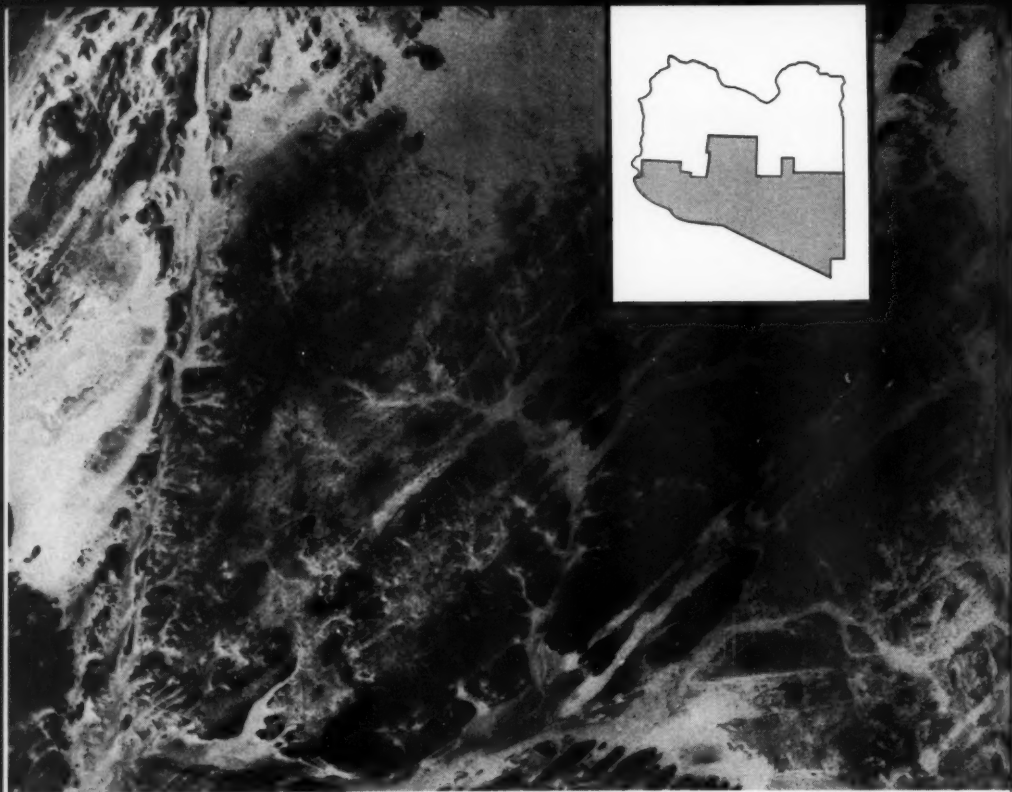
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Hardware and Talent

In conducting modern research, vast sums go into "hardware," the tools and equipment necessary to do the research. Mounting hardware costs in many present-day research and development projects sop up a large part of the research funds. The funds expended for scientific brainpower are small in many instances as compared with the cost of actually implementing the research conceived by the brainpower.

Mounting hardware costs in geological-geophysical exploration is the Juggernaut of the geoscientists of today. Compared with the cost of leasing, the fielding of complex survey crews, the costly exploration costs including access roads, drilling, etc., the cost of the guiding scientific talent is often insignificant. Yet this guidance, if it is poorly conceived or inadequately developed, can cause a great waste in exploration hardware costs.

In times when exploration incentives are high there is a clamor for scientifically trained men to guide research and exploration. Often—as it was about five years ago—the clamor for talent is so great that personnel with inadequate training are sucked into the picture and take responsible part in guiding exploration and research. The difference between the cost of an inadequately trained scientist and a well-prepared scientist is in most cases insignificant in comparison with the total hardware cost of an exploration project. The adequately trained scientist should be able to save this difference many times over. However, exploration fever is impetuous and when one is afflicted with a strong dose, one's sense of relative values is sometimes badly distorted. Thus expediency may take precedent over sagacity in planning boom time exploration. The push may be so great that there is no time to truly evaluate where one is going.

When the bloom is off the exploration-incentive "rose" as it is today, it is natural that exploration programs will be about as popular as a skunk at a Sunday School picnic. Naturally everybody wants to cut hardware costs in such times, but it is difficult to visualize why they shouldn't capitalize on the lull to stock up on qualified scientific talent and put this talent quietly to work on some truly original research-type thinking about exploration objectives and new ways to achieve them.



OUR COVER

Once again it's that time of the year . . . Season's Greetings to the geoscience profession from the staff of the A.G.I. and GeoTimes.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession, serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.



Above: Officers of the Norwegian Congress Committee. O. Holtedahl (right), T. F. W. Barth, J. A. Dons (left).

GEOLOGY IN NORWAY

By J. A. DONS¹

NORWAY, exclusive of Spitsbergen, covers an area of 324,000 km.² somewhat larger than the total of the British Isles. The population is 3.5 millions. The average elevation is 500 m, with the highest peaks approaching 2500 m. Since most of the country was recently subjected to glacial erosion, exposed rocks form a large part of the surface.

It is natural that geology has played an important role among the sciences in such a mountainous country; the first Norwegian University, founded 1811, was based on traditions of the Mining Seminar of Kongsberg, founded 1756. Norwegian geologists have given major contributions to the advancement of geology in general, only to be mentioned here are the names of W. C. Brøgger, J. H. L. Vogt and V. M. Goldschmidt.

The Geological Society, "Norsk Geologisk Forening", has about 250 members, 70 of whom are employed as geologists working in official or semi-official institutions. Few geologists are attached to the mining industry, because this industry is split into a large number of small independent mines, not using employed geologists.

At the University in Oslo, there are two geological institutions: Institutt for Geologi with a scientific staff of 10 geologists and some foreign research associates; Geologisk Museum with a scientific staff of 13 geologists and 6-12 foreign research associates. Norges Geologiske Undersøkelse (Geol. Survey) founded 1858 has a staff of 15-20 geologists. In a few years the Survey will move to Trondheim. This takes place according to an act of the Parliament and against the will of all geologists. The Geologisk Institutt with Museum at the University in Bergen has a staff of 7. The Geologisk Institutt at Norges Tekniske Høyskole in Trondheim has a staff of 5. The Geological Department of Tromsø Museum (situated in the town of Tromsø 70° north latitude) has 2 geologists. Norges Geotekniske Institutt, Oslo, has 3, and Norsk Polarinstitutt, Oslo, 4 geologists.

The preparations for the 1960 International Congress started in Norway on April 8, 1957 with the first meeting in the na-

tional Norwegian Congress Committee, appointed by the Government. The committee members are:

PROF. O. HOLTEDAH, *Inst. for Geologi, Oslo.*

DR. J. A. DONS, *Geol. Mus., Oslo.*

PROF. T. STRAND, *Inst. for Geologi, Oslo.*

PROF. N.-H. KOLDERUP, *Geol. Inst., Bergen.*

PROF. J. A. W. BUGGE, *Geol. Inst., Trondheim.*

PROF. I. TH. ROSENQVIST, *Goeteknisk Inst., Oslo.*

DR. O. J. ADAMSON, *Department of Defense, Oslo.*

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PROF. L. STÖRMER, *Inst. for Geologi, Oslo.*

DR. H. BJÖRLYKKE, *Director of Norges Geol. Unders., Oslo.*

¹ J. A. DONS, Geologisk Museum, Oslo, Norway.

This article is the second in a series of five on the geology and geologists of the Nordic countries that will be hosts to the geologists of the world attending the XXI International Geological Congress, Copenhagen, August 15-25, 1960. The first on Sweden, appeared *GeoTimes*, October, 1959.

PROF. A. KVALE, *Geol. Inst., Bergen.*

PROF. CHR. OFTEDAHL, *Geol. Inst., Trondheim.*

DR. T. WINSNES, *Norsk Pol. Inst., Oslo.*

DR. S. FÖYN, *Oslo.*

MR. S. S. NILSON, *State Department, Oslo.*

DR. G. RANDERS, *Director of Inst. for Atom-energi, Kjeller.*

During the last two years nearly all active geologists have been engaged in preparing for the 1960 International Congress. Of 38 excursions scheduled within the Nordic countries prior to the meeting in Copenhagen, 15 are in Norway. 9 of the 21 sections are staffed by Norwegian geologists. 13 post-congress excursions of 32 are again in Norway.

An extensive treatise (1100 pages with two large maps) of the geology of Norway (in Norwegian) was published 1953 by Prof. Olaf Holtedahl (*Norges Geol. Undersøkelse 164*). A new and shorter "Geology of Norway" (in English) is in preparation for the Congress with chapters written by various specialists and edited by O. Holtedahl. This book will be accompanied by a new and revised printing of the 1:1 mill. geological map (bed rock).

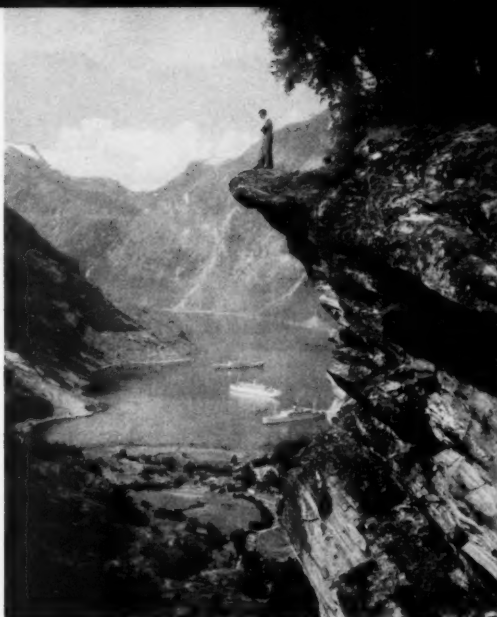
Norwegian publication series containing only geology are:

- 1) *Norsk Geologisk Tidsskrift* (Norwegian Geological Journal) published by Norsk Geologisk Forening, Oslo, one volume (4 issues) per year. This year's volume is No. 39.
- 2) *Norges Geologiske Undersøkelse*, Oslo, single publications, issued by the Geological Survey of Norway. The last publication is No. 210.

In these two series the papers are either in English, or provided with an English summary.

Series with mixed content:

VOL. IV, No. 4



Above: A western fiord seen from the central plateau (vidde). See excursions A 6, C 3.

Below: Tillites deposited on a glaciated surface. This locality will be visited on excursion A 3 to Northern Norway.

- 3) *Det Norske Videnskaps-Akademi i Oslo* (before 1925: Videnskapsselskabet i Christiania). Mat.-Naturvidenskapelige klasse. a) *Skrifter* (mostly monographs). b) *Achandler* (mostly short articles).
- 4) *Universitetet i Bergen. Arbok* (Year-

(Continued on page 36)

SCHOOL SCIENCE TEACHING

by
MASON L. HILL¹

**A solution to
periodic unem-
ployment of
geologists**

The September 1959 *GeoTimes* carried a thought-provoking discussion of unemployment and other problems of the geologic profession by Lewis G. Weeks. In it he stressed the necessity for more education in basic sciences and more post-graduate study in order to prepare geologists for their proper role in this age of science and technology. Weeks offered no panacea for unemployment—a currently unique situation for scientists due to an over-abundance of oil. However, he does point out that the irregular recruitment by industry leads to employment of the poorly-trained, alternating with non-employment of well-trained, geologists. Obviously, the proportion of oil geologists to those in other fields is too large to be healthy for either the profession or the oil industry.

A possible solution to this problem, and the more important one of better training and better use of geologists, appears in a solution of a far more critical problem. This problem confronts our entire American democratic society. It is the problem of finding a way to accelerate the science education of our population so that voters and administrators will know more and more about the rapidly advancing science and technology, instead of less and less.

It is reasonable to argue that geologists can play a key role in solving this fundamental problem of education because of two special situations. First, the American system of education requires everyone to attend high school; everyone needs as much understanding of science as he can be taught (along with the other basic disciplines); and general science should be the best introduction to science. Therefore, unless already adequately exposed, each 9th grader should be required to take an appropriate course in general science!

Second, geologists are preeminently qualified to teach general science because their training involves some study of many sciences (mathematics, chemistry, physics, biology, astronomy, meteorology, and oceanography, etc.); on the other hand, those who commonly teach this subject do

not have such a broad scientific background (which is probably why general science teaching has not been more widely successful); and, furthermore, geology is most suitable for the teaching of scope, methods, problems, applications and inter-relationships of the sciences. Therefore, geologists should teach general science in high schools!

Now, if the above reasoning is sound, an immediate start can be made to establish this program of education. This can best be done by individual geologists, with or without support from associates or local societies, through the persuasion of boards of education and school administrators that they should require general science of all their high school students; and that this subject should be taught by geologists. Thus, many thousands of geologists would eventually be recruited into secondary school teaching.

The effects of such a program can result in: (1) better training of more geologists (basic training for teachers rather than technological training for industry); (2) more college professors of geology to teach them; (3) more and better students exposed and attracted to the geologic profession; (4) more diversity in vocational opportunities for geologists (compensating for unemployment cycles in the oil industry); and (5) the establishment of the geologic profession as a powerful influence in the upgrading of the scientific knowledge of our society.

This solution to both unemployment and improving the status of the geologic profession, as a by-product of increasing the scientific literacy of our citizenry, seems to be compulsive, practical and attractively simple. Isn't this an important way for geologists to contribute to the life of our time? Aren't geologists uniquely trained to carry out this education program? And won't this approach best solve the problems of our profession? The answers to these questions may be yes! yes! and yes! Thus, it appears up to us, as good citizens, parents, educators, and especially as geologists, to help with the scientific education of our society while incidentally reducing unemployment and advancing our profession.

¹ MASON L. HILL, Exploration Manager, Richfield Oil Corporation, Los Angeles, California.

F. V. HAYDEN'S EARTHQUAKE CAMP 1872

In 1872 F. V. Hayden, the well-known geologist leader of the survey of the Territories of the United States described the Yellowstone Park region as an earthquake area. Hayden reported that earthquakes were felt at their field camp on the northeast side of Yellowstone Lake on the night of August 20, 1871. Almost to the day, some 88 years later U.S.G.S. geologists Witkind and Hadley were in the same area. They witnessed and reported on the devastating Hebgen Lake earthquake which struck the area on August 17 and 18, 1959 (Geo-Times, October 1959, p. 12-17). The epicenter of the 1959 quake was reported to be about half-way between Hebgen Lake and the site of the 1871 Earthquake Camp of Hayden, pictured above.

Hayden¹ on page 82 wrote the following:

The evidence is clear that ever since the cessation of the more powerful volcanic forces these springs have acted as the escape-pipes, but have continued to decline down to the present time, and will do so in the future, until they cease entirely. The charts accompanying this report will enable the reader to form a clear conception of the position and number of the most important springs in this basin, but an equal number of the dead and dying have been omitted. We may therefore conclude that the present system of hot springs and geysers is only a feebleness manifestation of those remarkable internal forces of the earth, which were so wonderfully intensified during the periods of volcanic activity, that they really present for our study a miniature form of volcanism. Even at the present time there are connected with them manifestations of internal heat and earthquake phenomena which are well worthy of attention. While we were encamped on the northeast side of the lake, near Steamboat Point, on the night of the 20th of July, we experienced



Earthquake Camp, near Steamboat Point, east side of Yellowstone Lake, so named from several slight shocks of earthquake which were experienced at this place on the night of the 19th of August 1871. Photo by W. H. Jackson, Courtesy of the U.S. Geological Survey film library.

several severe shocks of an earthquake, and these were felt by two other parties, fifteen to twenty-five miles distant, on different sides of the lake. We were informed by mountain-men that these earthquake shocks are not uncommon, and at some seasons of the year very severe, and this fact is given by the Indians as the reason why they seldom or never visit that portion of the country. I have no doubt that if this part of the country should ever be settled and careful observations made, it will be found that earthquake shocks are of very common occurrence."

In the same volume, A. C. Peale, the mineralogist who had a field party under Hayden that summer, wrote the following on pages 189 and 190: On the 19th of August we moved our camp farther down the Lake to Steamy Point. . . . Every night while at this place we experienced earthquake shocks, each lasting from 5 to 20 seconds. We named it Earthquake Camp.

The "Descriptive Catalog of Photos . . ." by W. H. Jackson² lists the photograph of the Earthquake Camp and dates the earthquake as occurring on August 19. It should be noted that Professor Peale reported earth tremors during a several day period, so that Hayden's August 20 dating is probably not in error.

ANTARCTIC RESEARCH

The National Science Foundation announces that final proposals for Antarctic research for the 1960-61 field season must be submitted on or before February 15, 1960. Proposals for research in the geosciences will be considered. For further information write *Antarctic Program Director, National Science Foundation, Washington 25, D. C.*

¹ F. V. HAYDEN, 1872, *Preliminary Report of the United States Geological Survey of Montana and Portions of Adjacent Areas*, Part 1, 204 pp.

² W. H. JACKSON, 1874, *Descriptive Catalogue of the Photographs of the U. S. Geological Survey of the Territories for the Years 1869 to 1873 Inclusive*, Misc. Publication No. 5, 88 pp.

PROFESSIONAL DIMENSIONS

OF THE

GEOSCIENCES

Professional geoscientists returned 14,437 register survey forms to the American Geological Institute during the period 1956-58. The total number of individual geologists and solid earth geophysicists who are receiving benefits of the Institute through membership in one or more AGI Member Societies comprises a professional group of about 24,000, as indicated by the integrated GeoTimes mailing list. The respondents to the register for this period thus constitute about 60 per cent of the profession.

Of the 14,437 respondents, 8715, or 36 per cent of the profession, returned questionnaires in 1956-57; 5722, or 24 per cent, returned them in 1958. The statistics on the geoscience profession presented here are based on an analysis of these data. During this same 1956-58 period, AGI registered 3225 graduating seniors and graduate students of geology-geophysics and 628 others who were not currently actively employed in the profession. These were omitted from the analyses.

The AGI has also been responsible for the registration of geographers, surveyors and mappers and photogrammetrists, but data on these persons are excluded from the analyses presented here.

The American Geological Institute has cooperated with the National Science Foundation in maintaining the Earth Science Register of the National Register of Scientific and Technical Personnel since 1953. Also cooperating in maintaining the Register are the American Chemical Society, American Institute of Biological Sciences, American Institute of Physics, American Mathematical Society, American Meteorological Society, American Psychological Association, Engineers Joint Council, Federation of American Societies for Experimental Biology and several federal agencies. Some 167,000 scientists have responded by supplying completed questionnaires to the National Register through these gathering agencies. About 63 per cent of all scientists who have received Register questionnaires have responded.

The National Register was established in response to a Congressional directive in the Act creating the National Science Foun-

dation. The Register was conceived to serve our country in time of national emergency as a scientific manpower reservoir. This, however, is only one facet of the total potential uses of the National Register. It would appear that the original concept of a register of scientific manpower for possible wartime emergency is not nearly so important today as are its potentialities as a peacetime tool in this era of science and technology. As is evident from the data presented in this article, the Register is a source of extremely valuable data on the relationships, growth and development of the scientific disciplines.

Currently much concern is being expressed over our future scientific manpower resources. Problems of screening and educating scientifically inclined youth for careers in science are being given much attention. The data on the different disciplines provided through the National Register are most important in considering these and other problems concerning the future scientific manpower requirements of our nation.

Results of the 1954-55 registration of geologists-geophysicists were published in the AGI Geological Newsletter (predecessor of GeoTimes) Volume 8, No. 8, February 1956 and in "Employment Profile of

¹ The material presented in the accompanying graphs and tables was compiled by Mrs. Bonnie C. Henderson, Supervisor, Earth Science Register.



Scientists in the National Register of Scientific and Technical Personnel, 1954-55," Scientific Manpower Bulletin No. 7, of the National Science Foundation, November 1956.

The data presented here in graphic and tabular form are preliminary in nature. A more complete analysis of these and similar manpower data for other scientific disciplines will be carried out and published by the National Science Foundation. These data may be subject to various interpretations. Discussion of the material in the graphs and tables will be limited to explanatory comments and a few interpretive observations.

In Figure 1 we see the percentage comparison of the geologists of all specialties to geophysicists based on data from the

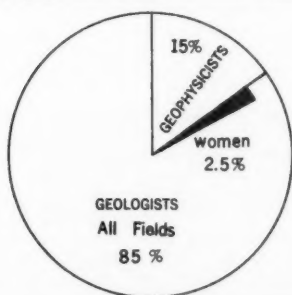


Figure 1. Percentage relationships of geologists of all specialties to geophysicists based on a preliminary analysis of data provided by respondents to the National Register 1956-58. The percentage of women geologists is also shown.

Figure 2. Percentage distribution of geoscientists by region of employment based on 1956-58 data from the National Register.

1956-58 respondents. Using the previously mentioned figure of 24,000 for the approximate number of all geoscientists in the United States, this percentage distribution would indicate that there are 20,900 geologists of all specialties and 3600 persons who call themselves geophysicists. These figures are probably not meaningful because solid earth geophysics and geology are intimately interwoven. Furthermore many of the scientists who are active in the field of geophysics will identify themselves as physicists, chemists, geologists, etc. The scientists engaged in meteorology and atmospheric physics, included in geophysics in its broadest sense, are registered in the National Register by the American Meteorological Society and are not included in AGI's data on geoscientists. Figure 1 shows that 2.6 per cent of the profession is composed of women practically all of whom are geologists. In the 1956-58 Register there was only a handful of women scientists identifying themselves as geophysicists.

The geographic distribution of geoscientists, Figure 2, shows the center of the geoscientist population to lie in the west south central area of the United States. This reflects quite obviously the distribution of geologists employed by private industry and particularly the petroleum industry.

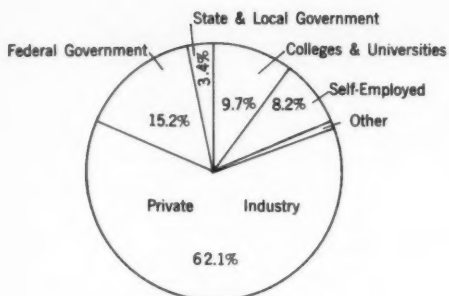


Figure 3. Percentage distribution by type of employer of geoscientist respondents to the National Register, 1956-58.

Type of Employer	1954-55	1956-58	Per Cent Change
Colleges & Universities	11.0%	9.7%	-1.3%
Other Educational Inst.	0.1	0.4	+0.3
Federal Government	16.3	15.2	-1.1
State and Local Gov't.	3.3	3.4	+0.1
Non-profit Research Org.	1.1	0.7	-0.4
Self-Employed	8.7	8.2	-0.5
Private Industry	59.0	62.1	+3.1
All Other	0.5	0.3	-0.2

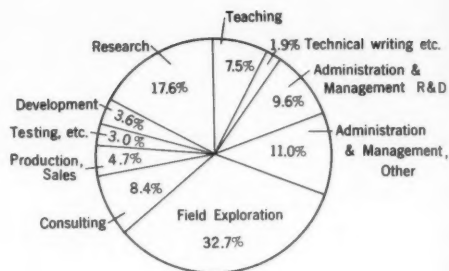


Figure 4. Percentage distribution by employment function of geoscientist respondents to the National Register, 1956-58.

Table 1. Distribution of geoscientists by type of employer, a generalized comparison of 1954-55 and 1956-58 data. It should be noted that categories were changed somewhat on the 1956-58 questionnaire.

Employment Function	1954-55	1956-58	Per Cent Change
Research, development & field exploration	52.0%	53.8%	+1.8%
Consulting	10.3	8.4	-1.9
Administration & Management	20.4	20.6	+0.2
Teaching	7.7	7.5	-0.2
Technical Writing	1.4	1.9	+0.5
Design	1.0	-	-
Testing and Inspection	1.2	3.0	+0.8
Production, Construction, etc.	4.2	4.1	-0.1
Technical Sales	0.8	0.7	-0.1
Not reported	1.0	-	-

Table 2. Distribution of geoscientists by employment function, a generalized comparison of 1954-55 and 1956-58 data. It should be noted that categories were changed somewhat on the 1956-58 questionnaire.

The distribution of geoscientists by type of employer is shown in Figure 3. Comparing the 1956-58 data with those for 1954-55 (Table 1) it will be observed that there was a 3.1 per cent increase in geoscientists employed by private industry while there was a 1.3 per cent decrease in those employed by colleges and universities.

The distribution of geoscientists by employment function is shown graphically in Figure 4 and in Table 2 the 1956-58 data are compared with the earlier 1954-55 information. The changes are relatively insignificant, indicating very little shift in the ways in which geoscientists are employed over the five-year period 1954-58.

Figure 5 is presented in two parts, A and B. On the 1956-58 questionnaires, respondents were asked to indicate their first scientific specialty and their second, third, fourth, and fifth areas of competency. Figure 5A is a generalized graphic comparison of the 1956-58 respondents by first specialties, while Figure 5B is a comparison of the average of all specialties (first through fifth) indicated by the 1956-58 respondents.

As a field of first competence, far more geologists indicated petroleum geology and general geology than any other specialty. Third among the first specialties selected was exploration geophysics. Petroleum

geology, exploration geophysics, economic geology and engineering geology represent specialties of application of geology-geophysics, whereas the other specialties such as structural geology, stratigraphy, etc., represent scientific subject matter specialties.

Based on the average of all specialties (first to fifth choice) some very significant differences are developed between figures 5A and 5B. After identifying themselves as petroleum geologists by first specialty, it appears that many petroleum geologists then indicate competence in stratigraphy and structural geology, for on an all-specialty basis these categories are up and petroleum geology is down percentage-wise. Similarly general geology drops from 27.1 per cent to 19.9 per cent.

It is significant to note that exploration geophysics drops from 8.7 per cent as a first specialty to 5.2 per cent as an all-specialty, but general geophysics does not increase conversely. This suggests that many geoscientists who specify exploration geophysics as a first specialty must specify either geology categories as second to fifth specialties or other specialties outside the geosciences such as physics, electrical engineering, etc.

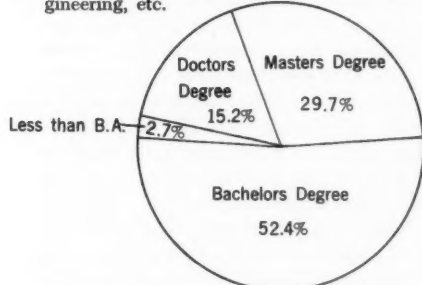


Figure 6. Percentage distribution by extent of education reported by geoscientist respondents to the National Register 1956-58.

It is evident that statistics on specialization in the field of the geosciences will never be completely meaningful until the specialties list is revised to eliminate the confusing overlap of applied specialties and scientific subject specialties.

The extent of education of register respondents is shown in Figure 6 and Table 3 compare 1954-55 and 1956-58 data. The rise of 5.6 per cent of employed geoscientists with education to the masters level is encouraging as is the drop of 4.4 per cent noted in those who have only bachelors training or less. It is discouraging, however, to observe that there was a drop of 1.2 per cent in the number of PhD's in

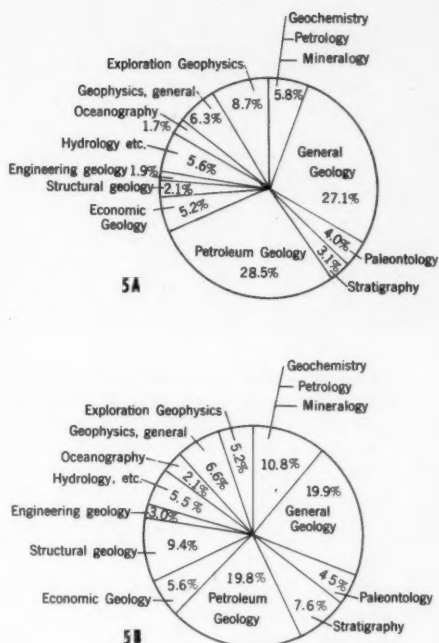


Figure 5.

A. Percentage distribution by first scientific specialties chosen by geoscientist respondents to the National Register, 1956-58. Note general geology, petroleum geology and applied geophysics.

B. Average percentage distribution of all combined specialties indicated by geoscientist respondents to the National Register, 1956-58. Compare with 5A (first specialties).

Level of Education	1954-55	1956-58	Per Cent Change
PhD	16.4%	15.2%	-1.2%
MA	24.1	29.7	+5.6
BA	54.9	52.4	-2.5
Less than BA and no report	4.6	2.7	-1.9

Table 3. Distribution of geoscientists by extent of education, a comparison of 1954-55 and 1956-58 register data.

the profession. It will be especially significant to observe changes in the relative distribution of these geoscientists by extent of education over the next five years in the light of higher recruiting standards which have accompanied the current employment recession. Considering the broad background required by the capably prepared geoscientists, not only in geology and geo-

Age	Median 1956-58 Income			
	All Respondents	PhD Respondents	MA Respondents	BA Respondents
Under 20	\$ 5,000	\$ --	\$ --	\$ 5,000
20-24	5,607	6,900	6,000	5,466
25-29	6,730	6,714	6,592	6,833
30-34	7,661	7,085	7,436	7,878
35-39	8,991	8,034	8,652	9,416
40-44	10,335	9,700	10,130	11,093
45-49	11,307	9,733	12,509	11,943
50-54	11,480	10,531	10,467	13,020
55-59	11,676	10,642	11,534	13,500
60-64	11,324	10,928	10,334	13,000
65+	10,286	10,200	7,900	10,858
All Ages	7,877	8,507	7,495	7,916

Table 4. Median professional income by age group and extent of education of geoscientist respondents to the National Register, 1956-58.

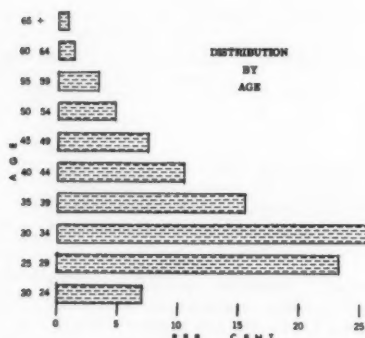


Figure 7. Percentage distribution by age groups of geoscientist respondents to the National Register, 1956-58.

Type of Employer	Median 1958 Income		
	PhD	MA	BA
Colleges-Universities	\$ 7,920	\$ 6,583	\$ 6,800
Federal Government	8,900	8,131	7,920
State & Local Gov't.	7,500	7,700	7,100
Private Industry	11,571	8,492	8,536
Self-Employed	14,333	12,769	11,535
All Categories	9,485	8,301	8,485

Table 6. Median professional income of geoscientist respondents to the National Register in 1958 by type of employer and extent of education.

Age	Median 1958 Income		
	PhD Respondents	MA Respondents	BA Respondents
Under 20	\$ --	\$ --	\$ 5,000
20-24	7,000	6,333	6,047
25-29	7,500	7,360	7,478
30-34	8,688	8,440	8,604
35-39	9,333	9,375	9,882
40-44	11,125	11,909	11,345
45-49	13,667	13,905	12,292
50-54	18,667	9,800	13,125
55-59	11,200	11,000	13,667
60-64	12,500	9,000	11,333
65+	11,500	7,667	10,750
All ages	9,462	8,066	8,389
Median age	37	32	32

Table 5. Median professional income by age group and extent of education of geoscientist respondents to the National Register in 1958. Note median age of respondents in each group.

physics, but also in the supporting basic sciences, it is surprising that more than half of the practicing geoscientists have only academic training equivalent to a bachelors degree or less.

Figure 7 depicts graphically the percentage distribution of employed geoscientists by age groups from 20 to 65 and over. The geoscientists are a young group. Half of the 1956-58 respondents were in the age group between 25 and 35 and 75 per cent of the respondents were between the ages 25 and 45. The median age for all respondents to the National Register, 1956-58, was 33.8 years. The median age of respondents by extent of education was 40.0 for those with doctors degrees, 31.9 with masters degrees and 31.8 with bachelors degrees.

Tables 4 through 7 present comparative data on salaries of geoscientists. Some interesting anomalies in salaries may be observed when analyzed from the standpoint of age groups and extent of education. Only one table (Table 4) gives salary data for the 1956-58 span. The other tables (5-7) are restricted to 1958 data.

Plans are being made by the National Science Foundation and the participating scientific societies including AGI for the circularizing of nearly 250,000 scientists of all specialties in early 1960 to obtain further current data on the growth and development of the scientific community.

PENN STATE GEOLOGISTS IN NEWS



O. Frank Tuttle



Elburt F. Osborn

President Eric A. Walker of Pennsylvania State University has announced the appointment of Dr. Elburt F. Osborn, dean of the College of Mineral Industries, as vice-president for research. He will be in charge of the administration of the University's \$8 million research program, succeeding Dr. M. A. Farrell, who, on his appointment, had asked to be relieved of the post at the end of two years. Dr. Farrell will continue as director of the Agricultural Experiment Station.

Since World War II the University's research program has been expanding steadily and has grown to encompass more than 1,200 projects involving both basic and applied research on a University-wide basis.

Dr. Osborn went to the University in 1946 as professor of geochemistry and chairman of the division of earth sciences. In 1952 he was named associate dean of the College of Mineral Industries and a year later became dean.

A native of Rockford, Ill., he graduated from DePauw University and took advanced degrees from Northwestern University and California Institute of Tech-

nology. During World War II he did research as a petrologist at the Geophysical Laboratory, Carnegie Institute of Washington. He is currently serving his third term as chairman of the Advisory Committee to the Mineral Products Division of the National Bureau of Standards.

Dr. O. Frank Tuttle, professor of geochemistry and chairman of the division of earth sciences, has been named by President Walker to succeed Dr. Osborn as dean of the College of Mineral Industries. A native of Olean, N. Y., but long a resident of Pennsylvania, Dr. Tuttle was appointed to his present post in 1953, succeeding Dr. Osborn. He received his B.S. and M.S. degrees from the University and his doctorate from Massachusetts Institute of Technology.

Prior to 1953, Dr. Tuttle was employed as a petrologist at the Geophysical Laboratory where he worked with the late N. L. Bowen. In 1952 he became the first recipient of the Mineralogical Society of America Award, given to a scientist 35 years of age or under who has made outstanding contributions to mineralogy and petrology.

Table 7. Median professional income of geoscientist respondents to the National Register in 1958 by employment function and extent of education.

Employment Function	Median 1958 Income			
	All Respondents	PhD Respondents	MA Respondents	BA Respondents
Research	\$ 7,797	\$ 9,196	\$ 7,653	\$ 7,633
Development, design	7,739	--	7,722	7,673
R&D Administration & Management	11,600	14,400	11,529	10,661
Administration & Mgm't., Other	11,960	14,333	12,428	11,667
Inspection, Testing, etc.	6,942	9,000	6,667	6,983
Production	8,069	11,000	7,714	8,056
Technical Sales, service	7,563	--	9,000	7,250
Field Exploration	7,805	9,450	7,683	7,760
Consulting	10,940	20,000	11,500	10,429
Teaching	6,750	7,611	5,900	5,125
Technical Writing	7,607	10,667	7,375	7,333
All Functions	8,433	9,472	8,066	8,396

J. PETER LESLEY

A Biographical Sketch

by ADDISON CATE¹

Geology in the United States is not as old as many of us in the profession today sometimes think it must be as we contemplate the tremendous volume of technical reports under the label "Geology" in the best of our libraries. Only one hundred and forty years have passed since an American geologist was born who was truly a pioneer, and in whose time geology as a science came of age. This pioneer, J. P. Lesley, was an unusual man in whom were combined qualities not always associated with geologists. He was not only a man of insatiable curiosity, but also one of deep reverence, deep affections, strongly held opinions and extravagant enthusiasms. A geologist who spent most of his professional life in Pennsylvania, he has left an indelible stamp on geology, and most especially in the Appalachian area, which would be the poorer without his contributions.

Named Peter Lesley, Jr., after his father, grandfather and great-grandfather, he found it convenient as a young man to transpose the "J" from "Jr." to read "J Peter Lesley," or simply "J. P. Lesley". His parents were of Scottish ancestry, and his grandfather had been a colonist-soldier in the American Revolution who finally settled in Philadelphia as a cabinet maker. To his father, also a cabinet maker, and his mother, J. P. Lesley owed his deep reverence for religious and ethical ideals, for the home of his youth was a devout Scottish Presbyterian one. His father also instilled in him the skills and discipline that later were to mark him as a master of accurate description and a draftsman of considerable ability. These qualities and skills led Sir Archibald Geikie to call him "the pre-eminent master of topographical geology", and another geologist to admire his descriptive literary style "which for terseness and unpolished emphasis" is "unequaled".

Lesley's first association with geology was somewhat accidental. Graduating from the University of Pennsylvania in 1838 in frail health, he was advised by a family friend to recoup his energies with a stint of work out-of-doors in rural Pennsylvania. There was an opportunity to work for the newly-organized Pennsylvania Geological Survey, under the leadership of 30-year old H. D. Rogers, and so as an untrained assistant he went into the Anthracite Region

in the summer of 1838, carrying with him, as essential baggage, volumes by Cowper and Carlyle and a flute.

For almost three years he was busy and happy in his geological work. The tremendous appeal to Lesley's imagination of the relationships between structure, erosion and topography was, for him, always an engrossing one. At one time in his old age he said modestly, "I was never anything but an amateur, except in topographical geology".

STUDIED THEOLOGY

Lesley however, was as yet uncertain as to what career would give him the greatest measure of satisfaction. Thus, in 1841 when the Pennsylvania legislature failed to appropriate funds for the continuation of the Survey, he decided to enter the Princeton Theological Seminary. In this period he was employed by Rogers during vacations to help complete reports of the defunct Geological Survey—largely by drawings of maps and sections.

In 1844 he graduated from the Seminary and went to Europe, ostensibly to continue his theological studies, but his interests were broad and his geological curiosity strong. His letters home were filled with observations of the European scene such as the similarity of the scenery of the valley of the Seine to that of the Mohawk; he visited the Auvergne region in France to see the volcanic rocks and appears to have been disappointed that the volcanoes were extinct, writing, "the exhibition is

¹ ADDISON CATE, Geologist, Oil and Gas Studies, Pennsylvania Geological Survey.

over". While studying and traveling in Germany he visited "little old Von Buch" who, somewhat to Lesley's despair, talked to his visitor not about structural geology and other matters of geological concern, but instead expounded on paleontological classifications and detailed lithologies. "When I said I thought the Jura just like the Alleghenies," Lesley reported, "he looked at me a decided 'no', for he had but one idea—the Jura limestone does not cross the Atlantic."

Back in the United States the next year Lesley worked briefly as an itinerant preacher in northern Pennsylvania. Then H. D. Rogers persuaded him to come to Boston to help complete Survey reports and to work on the first geologic map of Pennsylvania. He stayed on in Boston for several years, during which time he was named pastor of a Congregational church in Milton, Mass., and courted and married a New England girl, Susan Inches Lyman. The intellectual climate of the Boston area was exceedingly stimulating to a man of Lesley's curiosity and enthusiasms. However, his career as a clergyman suffered as a result of his exposure to, and advocacy of some of the liberal causes of the day, as well as from his occasional departures from orthodox religious views. Nonetheless, his heterodoxy could not have been too pronounced, for years later he made reference to "all ancient history back to the Noachian deluge."

By 1851, having made his decision to concentrate on the profession of geology, he once more worked briefly for the Pennsylvania Geological Survey when legislative appropriations again reactivated the organization. For the next few years he worked at various geological jobs for several employers, including the Pennsylvania Railroad. His mapping for the railroad in 1853-54, resulted in what is thought to have been the first use of geological maps with structural contours. At this stage his special field of interest was the geology of coal, and in 1856 he published his first book "A Manual of Coal and its Topography." In it he described the Appalachians as "a tangled hank to be untangled thread by thread and rearranged skein by skein—a tracery more elaborate and intricate than Gothic or Arabesque, a sphinx whose riddle has at last been read and written out by men like Henderson and Whelpley in what are now to be forever the hieroglyphics of geology". In 1856 too, the long-awaited geologic map of Pennsylvania was published. However, Lesley felt that H. D. Rogers had failed to acknowledge properly the contributions which he

(Lesley) and his colleagues had made to this successful project, and his indignation over the slight prompted him to write scathingly of Rogers in the preface to his own little book on coal.

Two years later he wrote another opus, "The Iron Manufacturer's Guide", which proved to be a worthy treatise for the mining industry. At this point his professional stature assumed a fair degree of renown, and, as a result, he was offered numerous opportunities for consulting work, ranging from Cape Breton to Tennessee. In further recognition, he was elected in 1863 as one of the fifty incorporators of the National Academy of Sciences—one of many academic honors bestowed upon him in his lifetime. In this year also he was engaged by the Pennsylvania Railroad to make a survey of special aspects of the steel industry in Europe.

The winter of 1865-66 found him once again in Boston, where he delivered a series of twelve lectures at the Lowell Institute on the subject "Man's Origin and Destiny". These lectures were remarkable for the variety of information that they contained, ranging from architecture to philology. For Lesley, it was an exhilarating experience to savor once again the atmosphere of erudition in these surroundings, and he wrote, "It is Heaven upon earth here, with nothing to do but read and talk and think". He found time also to publish "Five Types of Earth Surface", in which he formally subscribed to the doctrine of Uniformitarianism and renounced his previously held opinions of cataclysmic erosion.

The following six years found Lesley's talents still more widely employed. He had served on the faculty of the University of Pennsylvania as a professor of mining since 1859, but when in 1872 his academic responsibilities increased, he was made Dean of the newly established Towne Scientific School at that university. Early in this period also, he was named editor of the weekly "U.S. Railroad and Mining Register", a job which not only gave scope to his discursive and literary talents, but also involved a certain amount of lobbying in Washington.

Meanwhile, the Geological Survey had been reorganized in response to the clamor for help from the burgeoning oil industry in the area, and in 1874, Lesley was given his greatest opportunity to serve his profession—he was selected to direct the Second Geological Survey of Pennsylvania. This challenge to his varied talents he met with great enthusiasm.

(Continued on page 45)

EMPLOYMENT OUTLOOK

AGI Reports on a
Survey of Employment
In September 1959

The AGI conducted a survey of employment during the month of September 1959 in an effort to determine the nature and extent of unemployment among geologists and geophysicists. Results of this survey indicate quite definitely that less than 5 per cent of the geoscientists of the country are unemployed and that the nation-wide unemployment figure for the profession is probably about 2.6 per cent.

This survey has obvious limitations, but it is believed that it affords a reasonably accurate sampling of the employment picture. It is hoped that these data will aid in developing more stable employment in the profession.

The survey was addressed to the local societies with geologist-geophysicist members, principally the local geological societies affiliated with the AAPG and SEGp and the local sections of AIME. In the case of the local sections of AIME the information requested was restricted to geologist-geophysicist members. Summarized below are the data on the number of questionnaires mailed and returned.

As might be expected, returns from AIME local sections were not very high, since many of these sections are composed of metallurgists, mining engineers and petroleum engineers with only a handful of geoscientists. Nevertheless it appears that about 25 per cent of the geologist-geophysicist members of AIME were sampled in the AIME returns. The results are summarized in the following table.

graduates of geology are, for the most part, not yet members of local societies.

All responding societies reported that the employment situation for recent graduates with only a bachelor's degree was quite grim and not likely to improve. They reported that the recruiting of recent graduates which was being done was restricted to men with graduate degrees. It is debatable as to whether recent college gradu-

TYPE OF SOCIETY	SURVEY FORMS MAILED	FORMS RETURNED WITH NO DATA	USEFUL DATA	
			FORMS RETURNED	PER CENT RETURNED
Local Geological Societies	46	2	19	41
Local Geophysical Societies	21	1	13	62
Local Sections AIME	78	16	10	13

We assume there are approximately 24,000 geoscientists, based on National Register and GeoTimes circulation data. The survey appears to have sampled about 35 per cent of the total profession. About 40 per cent of all AAPG members and about 35-40 per cent of all SEGp members are judged to have been covered by the survey.

It should be noted that the returns were from societies composed primarily of geologists employed by industry and therefore these returns should be quite indicative of the employment status as currently affected by curtailed exploration in petroleum and mining. On the other hand recent

ates with no graduate work and who have not been professionally employed should be considered as part of the profession and consequently numbered among its unemployed. Furthermore, with industry's present recruiting directed to the master's degree level and above there is a question as to whether the recent graduate with only a bachelor's degree is acceptably trained to qualify as a professional geologist. Recruiting standards for teaching, research and employment by geological surveys generally specify some graduate work.

Although some areas report no unemployment of geologists and geophysicists, the mountain states appear to have more

GEOLOGISTS HONORED

Sir Edward Bullard, Dr. Adolph Knopf and Dr. Jack L. Hough, left to right, were awarded the Geological Society of America's highest honors at the recent annual meeting in Pittsburgh.

The Penrose Medalist awardee was Dr. Adolph Knopf, noted geologist and professor at Stanford University. He has made valuable contributions to his profession through his studies of the age of the earth, the origin of vein deposits and the nature of volcanic rocks. Dr. Knopf was president of the Society in 1945.

Sir Edward Bullard of Cambridge, England was awarded the Arthur L. Day Medal for his many significant contributions to geology through physics. These include the development of instruments used to solve problems relating to the earth, such as its structure and its gravitational and magnetic fields.

The recipient of the Kirk Bryan Award,



Dr. Jack L. Hough, won the award for his study of fresh water oceanography conducted in the Great Lakes.

The 72nd Annual Meeting of the GSA was the largest convention in its history with over 2,200 members and guests in attendance.

TYPE OF SOCIETY	NUMBER OF SOCIETIES REPORTING	TOTAL GEOSCIENTIST MEMBERSHIP	UNEMPLOYED GEOSCIENTIST MEMBERS	PER CENT UNEMPLOYED
Local Geological Societies	19	5918	172	2.9
Local Geophysical Societies	13	1577	31	2.0
Local Sections AINE	10	708	8	1.1
TOTAL	42	8203	211	2.6

unemployment than other areas. Locally in California and Texas reports indicated slightly greater than average unemployment.

The employment outlook picture as reported by the responding societies is difficult to summarize. Most reported the employment outlook as static or getting worse, particularly for the younger men with inadequate graduate training. Some reported, however, that the employment situation is improving.

It was generally reported that a substantial number of the recent graduates with only bachelor's training who had not been able to find a position were either entering graduate school, or were leaving the profession. Some respondents indicated that at least part of the recent graduates were going back to school to acquire minimum education courses for certification as a school science teacher. The recent graduate in geology-geophysics, if he has had a sound undergraduate curriculum in the geosciences, is ideally prepared for school science teaching. He should already have a solid background in math, physics and

chemistry in addition to his geology courses. He should need only to add the basic courses in education, which unfortunately stand between many capable, science-trained teaching candidates and science teaching positions which are unfilled or incompetently filled.

The survey when viewed in perspective would suggest that unemployment among geologists-geophysicists is not as critical as it has been supposed. However, with the outlook reported by many as "static" to "growing worse" the employment conditions could worsen. The net effect of such a situation will be a drying up of students majoring in geology. It should result also in a gradual upgrading of the level of education for the profession as a whole. In manufacturing and marketing, the law of supply and demand can be allowed to control the flow of goods. Since 6 to 8 years is necessary for the academic preparation of a well-rounded geoscientist, shortages could occur in the future if the enrollment pendulum swings too far. Certainly the profession as a whole should be seriously concerned with a stable employment outlook.

A Comparison of

LUNAR AND TERRESTRIAL FEATURES

By

JACK GREEN¹

The origin of lunar surface features by predominantly impact processes does not satisfactorily explain many subtle surface details. Volcanism of a special type is considered a more plausible mechanism for creation of lunar craters and their internal morphology. What appears to be faulting and pressure ridging are two additional features on the moon that can be explained by the normal geological (or selenological) processes that often accompany caldera and basalt basin evolution. Although the scale of the photographs of lunar and terrestrial features in Figures 1 and 2 (on the opposite page) is quite different, it is nevertheless instructive to compare what could be the terrestrial analog with the lunar feature shown. Additional comparisons of lunar and terrestrial surface details are published elsewhere (Green, 1959).

Figure 1 illustrates "Serpentine Ridge" in Mare Serenitatis, which is over 160 miles (257 km) long and has an elevation approximating 800 feet (244 m). "Serpentine Ridge", discovered by Schröter, (1791-1802) is thought to be a pressure ridge possibly of basalt similar to the one shown in the Sierra Negra caldera on Isabela Island of the Galapagos Archipelago (Banfield, Behre, and St. Clair; 1956; plate 2). Here, lateral thrust probably accompanied by some central subsidence created a remarkable pressure ridge of basalt about 3.5 miles (5.6 km) long. The white areas in the terrestrial photograph are sulfur-bearing solfataras.

Figure 2 shows the Straight Wall on the west side of Mare Nubium, apparently a subsidence fault 60 miles (96.6 km) long within an inundated crater. The displacement is estimated at 800 feet (244 m), with the crater Birt on the downthrown side. A similar feature is shown in the Darwin caldera 45 miles (72.4 km) north of the Sierra Negra caldera on Isabela Island (Banfield, Behre, and St. Clair; 1956; plate 3). The fault, produced by subsidence of the central caldera floor, is

around 2 miles (3.2 km) long with a displacement of 200 feet (61 m). A relatively smooth cinder terrace is on the upthrown side.

Note spatter cone alignments and fracture and flow pattern in the terrestrial photographs of both Figures 1 and 2. Additional detail on volcanism of Isabela Island is given by Richards (1956).

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New 1960 Edition

DIRECTORY OF GEOSCIENCE DEPARTMENTS

AGI Report 11, 6th Edition

A directory of departments of geology-geophysics in the colleges and universities of the United States and Canada, with a section on geology summer camps.

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¹ DR. GREEN is geologist with Aero-Space Laboratories, North American Aviation, Missile Division, Downey, California.



Figure 1. Comparison of Ridging Features in Mare Serenitatis and Sierra Negra Caldera.

Above left: "Serpentine Ridge" in Mare Serenitatis (Photograph by 40 inch telescope of Yerkes Observatory, courtesy of Dr. G. P. Kuiper).

Above right: Pressure ridge in Sierra Negra Caldera, Galapagos Islands (Photograph taken from 20,000 feet (6100 m) by U. S. Air Force in cooperation with the government of Ecuador). Released by Ecuadorian government through U. S. Air Force.

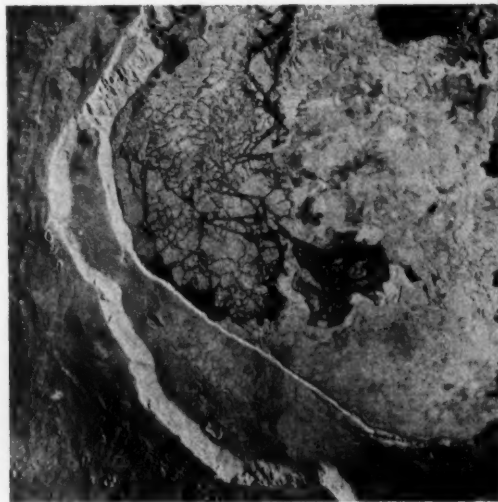
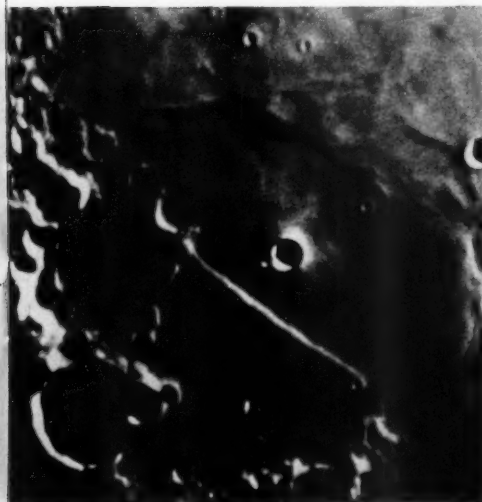


Figure 2. Comparison of faulting in inundated lunar crater and Darwin Caldera.

Above left: Straight Wall, west side of Mare Nubium (Photograph by 60 inch telescope of Mount Wilson Observatory, courtesy of Dr. D. D. Alter).

Above right: Subsidence fault, southwest side of Darwin Caldera, Galapagos Islands (Photograph taken from 20,000 feet (6100 m) by U.S. Air Force in cooperation with the government of Ecuador). Released by Ecuadorian government through U.S. Air Force.

TIME FOR SCIENCE

Geology Goes
on TV in
Washington, D. C.

by EDWIN ROEDDER¹

Some 45,000 5th and 6th grade pupils have been learning a great deal about the earth sciences, from trilobites to tritium, as a basic part of a series of educational TV programs, "Time for Science". Broadcast from 11:30 to 12:00 noon every day by WTTG-TV in Washington, D. C., these programs are received by over 1,300 classrooms in the area. As this pilot program, presented by the Greater Washington Educational Television Association (GWETA), represents one of the pioneering efforts in the application of the medium of television to science education at the elementary school level, and as the earth science classes were particularly successful in stimulating interest, it is felt that a discussion of the program in *GeoTimes* may encourage other groups to become active in this very rapidly growing field.

The first broadcast in the "Time for Science" series was on September 22, 1958, and the series has continued for ½ hour each day throughout the school year. Behind this matter of fact statement, however, is a great deal of careful planning and cooperation by many organizations and individuals, in addition to what are presumably the inevitable headaches stemming from inadequate "lead time" and a "shoe-string" budget. GWETA was incorporated as a nonprofit organization in 1953. In a poll, the various school superintendents requested unanimously that a 5th and 6th grade science course would best fill a curriculum need and be most adaptable to television. Among the many reasons for this decision was the fact that although children in these grades are ready for science and take to it eagerly, the demands on the classroom teacher are such that she can hardly be expected to have the time for assembling materials and apparatus needed for the demonstrations and visual aids so necessary for the effective teaching of science. In addition, few schools have the funds to provide adequate supplies of such visual aids. It was not felt, however, that

these programs could or should supplant the classroom teachers; they were designed specifically to supplement the classroom teacher's presentation by providing a wealth of factual material and visual aids which the classroom teachers could use as they saw fit in follow-up sessions after each program. Teachers of the participating classrooms received advance lesson plans and other material to aid them in making best use of the programs.

At the start of the series in September 1958, 12 school systems were cooperating in the pilot program with about 20,000 children watching. Within three months the viewing audience had grown to 17 school systems, with 1,362 classes totaling about 45,000 students and their teachers. As the program is broadcast over a commercial station and available to all, many parents joined in viewing in an attempt to keep up with Johnnie. An evaluation of the program by the staff of the American Institute for Research, and abundant evidence from both teachers and pupils, have shown that the program has done more than merely serve up a group of facts on a fluorescent platter; it has stimulated the youngsters to conduct experiments and to seek further information by outside reading. Not only were the teachers given much valuable background material not otherwise readily available, but also emphasis was placed on an appreciation of the scientific method and the value of curiosity.

The programs were of two types; the regular series on Mondays and Wednesdays (and repeated on Tuesdays and Thursdays), presented in black and white by the studio teacher, from the WTTG-TV studios, and the Friday series, produced at the studios of the Television Division of the Armed Forces Institute of Pathology at the Walter Reed Army Medical Center and broadcast, in color, after transmission by microwave to WTTG-TV. The repetition of the weekday shows was to aid in scheduling at schools where there were more viewing classes than TV sets; it was done "live" due to lack of funds for tape or

¹ EDWIN ROEDDER, U. S. Geological Survey, Washington, D. C.

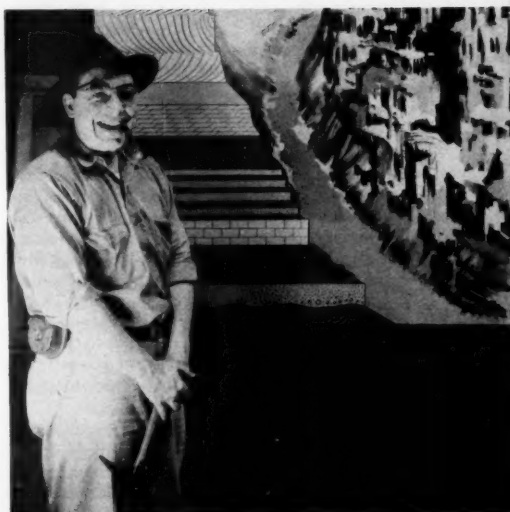


Above left: Author Ed Roedder before the color TV camera presents lecture on crystals.



Above right: TV classroom teacher T. Darrell Drummond discusses model oil derrick project with young science students.

Lower right: Survey geologist Tom Dutrow poses before a schematic drawing of Grand Canyon used to illustrate "The Study of Layered Rocks".



kinescope recording. The Friday programs were enrichment material, related as closely as possible to the content of the regular programs, but each centered about a specific facet of science, presented by scientists from the area. These Friday programs were kinescoped with sound track on 16 mm color film at Walter Reed.

Television is an expensive medium, and, as with many educational ventures, this one would not have been possible without numerous donations of time and money. The excellent color TV studio facilities and services for the Friday programs were donated by the Television Division of the Armed Forces Institute of Pathology; the Chesapeake and Potomac Telephone Co. made a donation to cover the cost of the microwave transmission; the National Science Foundation awarded a grant allowing the purchase of the color film masters and one print of each of the Friday programs; and station WTTG-TV donated the time on the air (replacing, incidentally, a filmed program of Liberace at the piano). The remaining costs, including office expenses and particularly salaries of TV cameramen and technicians, as well as that of the studio teacher, T. Darrell Drummond, an elementary school teacher from Falls Church, Va., were covered by grants of \$30,000 from the Eugene and Agnes Meyer Foundation, \$15,000 from the Fund for the Advancement of Education (the Ford Foundation), plus \$2,000 from other sources. It is interesting to note that this total \$47,000 budget—for 150 one-half hour programs—is the approximate cost of a

single ½ hour commercial network program. Some of the TV sets were purchased by the school systems and others were provided by PTA or community groups.

The program content drew rather heavily from the earth sciences in the first three areas, each consisting of 20 different lessons. Area 1, Beyond the Earth, was centered in part about the IGY, (a continuing theme throughout the year), and so presented much earth science in discussions of the solar system, the sun's effect on the earth, the seasons, tides, gravity, etc. Area 2, The Earth, was essentially all geology; the subjects of the 20 lessons were as follows:

- It's A Big World
- The Air Around Us
- Weather, Parts I, II, and III
- Waters of the Earth—The Salty Seas
- Waters of the Earth—The Inland Waters
- Land Forms of the Earth

(Continued on page 51)

DEVELOPING A BETTER GEOLOGICAL PROFESSION

by

PAUL H. FAN¹

During the summer months of 1958 many graduates in geology, both from large universities and from small Liberal Arts colleges, descended upon Houston, the so-called "Oil Capital of the World". These recent graduates, encouraged by the commencement speakers, and armed with their diplomas came seeking employment, and no doubt dreaming of the days when they too would be fabulous oil men. After a few days for some, a few weeks for others, the endless walking of pavements from one oil company to another brought the shocking realization that jobs were not available. Most of the job seekers probably were unaware that mining and oil companies were in the process of reducing their own geological and geophysical staffs, both by discharging young members and by retiring older members before they reached their official retirement age.

The 1957-1958 Recession is officially over. Unfortunately, the employment situation of geology graduates has not improved from last year. It is true that the number of openings may be slightly higher than last year, but the backlog of unemployed from the previous year, added to the large number of June and August graduates of this year aggravates the already grim situation.

Is this surplus of geologists a permanent phenomenon or will the good old days return in a year or two? Since the Second World War, there has been a considerable expansion in the number of geology departments. According to a recent survey made by the AGI, there are more than 200 colleges and universities offering degrees in geology at the present time with over 10,000 students majoring in geology.

A few years back the independent oil operators employed a large number of geology graduates at the Bachelor's level each year. Unfortunately, due to the keen competition from the foreign oil, especially since the end of the Korean War, the small independent oil companies have their backs

to the wall, and many of them are struggling for their very existence. It is believed that this critical economic situation will not be changed in the foreseeable future, unless there is a change in national policy, which is unlikely in the years ahead. As long as this condition persists, job openings with these independents is not likely to improve. A grim situation is confronting us. Enough jobs are not available for the huge number of geological graduates turned out year after year, especially for those who do not have graduate training. It seems apparent that something drastic should be done quickly before our profession reaches a point of no return.

The geological science is essentially a border area. The recent trend for paleontology has been in the direction of biology, other areas are more interwoven with chemistry or physics, and a *student of geology needs first to be a biologist, chemist, or physicist*. On such a broad and solid foundation, a training in earth science may then be superimposed. It is obviously impossible for an undergraduate to be well disciplined in both these aspects, but would it not be better for students of the *science of geology* to concentrate their major effort on mathematics and other basic sciences and postpone their professional training until they reach the graduate level. Geological courses taught on the undergraduate level may be offered as a part of the Liberal Arts program, in order to meet the laboratory science requirement of such schools, and also to provide students with an introduction to the Earth Science field. Geological courses, however, should not be provided to undergraduates as a major subject. The advantages of this reorganization seem to be many:

1. The elimination of undergraduate majors would reduce the annual number of graduates drastically, thus restoring a favorable balance to the law of supply and demand.
2. The quality of students wishing to make geology their life profession would automatically improve by virtue of the fact that only the better students may enter the graduate schools, and mediocre students are eliminated during the pre-professional training.
3. Presently the scope of geology is too narrow. Geochemistry, geophysics and geology constitute an overall *geoscience* that could be organized to replace obsolete geology departments. If the study were placed on a graduate level, course emphasis could be on a more scientific basis, requiring more biology, chemistry and physics.

¹ PAUL H. FAN, Chairman, Department of Geology, University of Houston.

Two Geologists Receive NSF Postdoctoral Awards

Under the Postdoctoral Fellowship Program of the National Science Foundation 35 awards were recently announced for advanced study and research in the sciences.

Included in the 35 fellowship recipients were two geologists. Margaret B. Davis will continue postdoctoral research at the California Institute of Technology as an NSF Postdoctoral Fellow and Horace R. Blank, Jr. of the University of Washington will be continuing his studies at the University of New Zealand.

The National Science Foundation is currently accepting applications for awards to be made in March 1960 in its Graduate and Postdoctoral Fellowship Programs.

Earthquake Conference

Tokyo, Japan
July 11-18, 1960

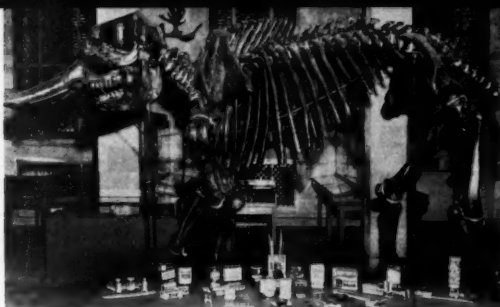
The Second Circular for the Second World Conference on Earthquake Engineering has been issued by the Science Council of Japan. The conference will take place July 11-18, 1960, in Tokyo and Kyoto, Japan. The program will deal with nature of earthquake motion and resultant damage from the scientific standpoint. It will also direct attention to problems of design and construction in earthquake areas.

For additional data on the conference write *Organizing Committee, Science Council of Japan, Ueno Park, Taito-ku, Tokyo, Japan.*

4. In the past, geology has leaned too heavily on the petroleum and mining industries for employment. Our areas of activity should be expanded to include not only the "study of rocks", but also geochemical and geophysical studies of the ocean, the atmosphere, the broad application of radiochemistry and trace elements to *geoscience*, and the important fields of crystal chemistry and silicate chemistry.

Although the proposed program suggests a drastic reorganization within many geological departments, the expansion of our professional frontiers is long overdue.

A nation-wide accrediting agent is suggested, in order to give recognition to professional schools, and to deny accreditation to those that fail to meet the required qualifications.



MATILDA

Bones up
for quiz

Last February, even before everybody found out that TV quiz shows were crooked, the members of the Geological Society of New Jersey unwittingly held a quiz show—*Geology in a Supermarket* in which the principal was Matilda the Mastadon who had been carefully boned-up by Dr. Glen Jepsen of Princeton.

The Society, in its third year as an association to provide better contact between professionals and amateurs with an interest in geology, has about 160 members. Last February its members met at the State Museum in Trenton to honor Matilda the Mastodon on the fifth anniversary of her being discovered and subsequently excavated by the New Jersey Geological Survey. She was mounted by preparators of the American Museum of Natural History and the State Museum with Glen Jepsen, Professor of Vertebrate Paleontology of Princeton as Technical Advisor. On the occasion of the 5th anniversary, Dr. Jepsen reviewed the significance of the find and gave Matilda's vital statistics.

The quiz show—*Geology In A Supermarket* proved a real stumper for those in attendance at the meeting—professional and amateurs alike. From the shelves of a nearby supermarket a selection of 36 items were displayed and listed on quiz sheets. Contestants were asked to name the mineral product, the form of ore from which they were derived, and one locality from which the ore is derived. The selection included such things as epsom salts, pencils, salt, matches, etc.

It is understood that Matilda beat all of the other contestants because she had been boned-up by a professional. However, even a congressional committee is unlikely to get her to talk. Despite the furor over fixed quiz shows, the New Jersey Geological Society says it will continue with a new series—*Geology In The Kitchen*.

CONGRESS

corner

news and information on the

INTERNATIONAL
GEOLOGICAL CONGRESS
NORDEN

August 15-25 1960

The Third Circular for the XX1st International Geological Congress will be issued about January 1960 and will go automatically to all who have already completed and submitted application forms included with the Second Circular, together with the appropriate registration fee.

Persons who have only recently decided to attend the Congress may secure the Second Circular by writing Congress Travel, American Geological Institute, 2101 Constitution Avenue, N. W., Washington 25, D. C.

In submitting the registration fees some geologists have asked the question, "Is it necessary to register my wife and children?" To insure hotel accommodations through the Organizing Committee for all members of your party you must list and pay a \$10 registration fee for each in addition to your own \$25 fee. Part of this fee is considered a hotel deposit fee.

If your wife is also a geologist—and there are many geologist wives of geologists—you may both wish to participate in the scientific sessions, but receive only one set of Congress publications. In this case you need to pay only one attending membership fee and one accompanying membership fee.

As we indicated in this column last month, there is still a good possibility that you can register for the field trip of your choice among the wide selection of pre- and post-Congress excursions listed in the Second Circular. You should not delay, however, if you have not already made application.

If a person wishes to apply for one numbered excursion which is scheduled to join another numbered excursion he should submit a deposit for two (2) excursions. The deposits, of course, apply toward the cost of the excursions.

LAND OF THE TOLLUND MAN. *The Prehistory and Archeology of Denmark by Palle Lauring and translated by Reginald Spink. MacMillan, New York, 1958, 160 pp., \$6.00.*

This book is recommended for the persons who want to get the feel for the

AAAS—SECTION E

Chicago, Ill.

Dec. 26-31, 1959

The Annual Meetings of the American Association for the Advancement of Science will be held in Chicago, Illinois, December 26-31, 1959.

The Section E. Geology & Geography, program arrangements have been made through the program committee, Frank C. Whitmore, Secretary Section E, Chairman.

The main feature of the Section E program will be a symposium on the Great Lakes which will bring together outstanding specialists on geology, geography, hydrology, meteorology, engineering and planning. There will also be four other symposia on a group of papers on the Late Quaternary of Southwest Asia.

The Vice President of AAAS for Section E, Professor Byron Cooper of Virginia Polytechnic Institute, will give the annual address at the Section E smoker on December 29. His subject will be "Role of Subsidence in the Origin and Evolution of the Appalachian Mountains." Dr. Howard A. Meyerhoff, Executive Director of the Scientific Manpower Commission and a past Executive Secretary of the AAAS, will assume leadership of Section E in the coming year.

The technical program for Section E is summarized as follows:

- Quantitative Terrain Studies—A symposium, Dec. 27 and 28.
- Economic Changes in an Underdeveloped Area—A symposium, Dec. 28.
- Origin and Development Limestone Caverns—A symposium, Dec. 28.
- The Geographer's Role in Transportation Studies, A symposium, Dec. 29.
- The Great Lakes Basin, A Symposium—The Natural Setting of the Great Lakes Basin, Dec. 29.
- Man's Adaptation in the Basin, Dec. 29.
- Utilization of Water in the Basin, Dec. 29 and 30.
- Problems Arising from Developments in the Basin, Dec. 30.
- Summary by George B. Maxey, Geologist, Illinois Geological Survey, Dec. 30.

earliest foundations of Danish culture before attending the Congress. It is scientifically accurate, interestingly written and very well illustrated.

UNEMPLOYMENT AND OUR MORE BASIC PROBLEMS¹

— A Discussion —

by
THOMAS W. FLUHR, P.E.²

Dr. Weeks is to be complimented for calling attention, not only to the unemployment problem, but also to the matter of professional recognition. It is pertinent to devote further attention to the latter. Evidently there are some people who do not regard Geology as a profession, and others who recognize it as a second-rate one. This condition is to be deplored. It is necessary to inquire as to why such attitudes have arisen.

To be a professional man implies two attributes; (a) an ethical character, and (2) a recognition of his responsibilities to society. There are many geologists who, by their attainments, their sense of ethics, and their sense of social responsibility are universally regarded as being professional men. There are many teachers of geology who are also regarded as being professional men. What many of these do not understand is that they are considered to be professional men because they are teachers, not because they are geologists. There is a third group of geologists who like to regard themselves as professional men, but who are not universally regarded as such.

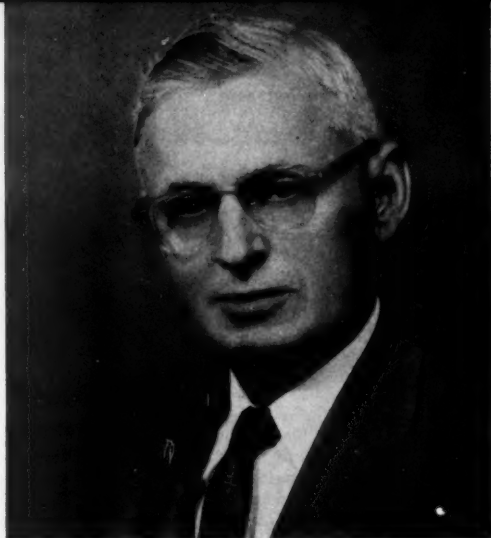
It is not sufficient that a number of members of a profession should be of professional caliber. It is also necessary that they impress on their fellows the attributes which distinguish the professional from the non-professional.

The legal profession, the medical profession, the engineers, and others differ from the geologists in important respects. They have united themselves into professional societies. These societies set up standards of ethical conduct. They impress their members with a sense of responsibility to society. They limit their membership to men who have technical training and experience.

As far as I know, no geological organization furthers professional standards. Geological publications are devoted to the dissemination of scientific knowledge. Seldom,

¹Unemployment and Our More Basic Problems, by Dr. L. G. Weeks, GeoTimes, Sept. 1959.

²THOMAS W. FLUHR, P.E., Engineering Geologist, Downsville, N. Y., is president of the Delaware County (N. Y.) Chapter, New York State Society of Professional Engineers.



HOLLIS D. HEDBERG is the new president of the Geological Society of America. Dr. Hedberg is leaving his post as Vice-President of the Gulf Oil Company to join the geology faculty at Princeton University.

Going, Going, Gone!

"Some years ago," the Walrus said,
"They put a sputnik overhead.
No mole, no fish, nor even bat
Could then excel a bureaucrat.
Beneath the earth, above the sky . . ."
The Penguin interrupted, "Why?"
"To prove it all within their ken,
They conquered outer space, these men."

"Where are they now? Above? Below?
Or is there somewhere else to go?"
"You silly bird! They had a pattern.
'Twas Mars, then Venus; now it's Saturn.
Each guy and doll, and poppoo too,
Had a ship with a stellar view.
The rockets built kept pace with birth;
They shot themselves clear off the earth!"

—Duncan McConnell

if ever, does one find a comment on ethics or on social responsibility.

In order to practice Law, Medicine, Engineering, or various other professions, one must pass a qualifying examination. Anyone with little or no training, is at liberty to hang out his shingle as a geologist. No official or unofficial body questions his right to do so. It is then, not at all surprising that the general public cannot distinguish the professional from the non-professional.

As long as the geologist prefers to remain a rugged individualist, as long as he fails to unite with his fellows in professional societies, as long as he ignores ethical and social responsibilities, he has no one but himself to blame if Geology is not recognized as a profession or is considered at best a second-rate one.



MANPOWER in a column —

By HOWARD A. MEYERHOFF

Scientific Manpower Commission
1507 M Street, N.W., Washington 5, D. C.

The Office of Education has just released its survey of "Junior-Year Science and Mathematics Students—Fall 1958" (Circ. No. 577). Although the statistics are a year old, they are still significant.

Unlike engineering, in which freshman enrollment dropped 11.1 percent and junior enrollment went down 2.5 per cent, the number of science and mathematics majors registered an increase of 10.4 percent as compared with the fall of 1957. This was three times the percentage increase in the total number of juniors in all fields. The distribution is more interesting than the percentages.

Apparently the widely plugged slogan "Take Math" had its effect, for math majors jumped 31 percent between September 1957 and September 1958. Biological sciences scored a 6.3 percent rise, but the physical sciences merely maintained the national average of 3.8 percent.

Within the physical sciences, however, the breakdown reveals marked contrasts. Physicists went up 10.9 percent; chemists, only 3.2. Geology enrollments tumbled 10.7 percent. Women, who never have been especially numerous, all but deserted the field, the highest female enrollments being recorded at Phillips University, Oklahoma (7), and Mount Holyoke (5). In contrast, 5.2 percent more women entered chemistry, and 16.9 percent more the male sanctorum of physics.

The Office of Education points out that this crop of majors will yield 45,000 bachelors in science and mathematics in June 1960—a rise of 20 percent from the June 1958 figure. Approximately 60 percent of this increase will be in mathematics, in which postgraduate losses to professional employment run high.

Elsewhere among the disciplines surveyed, physics—and physics alone—presents a satisfactory picture. The gain in biology was in general biology—medical biology, where the need for manpower is greatest, suffered substantial losses. Chemistry failed to hold its own against the over-all increase in the junior-year population.

As for the earth sciences, the decline reflects no more than an initial response to the current low demand. Of the 213 institutions offering geology majors, 10 (including the University of Chicago) re-

INTERNATIONAL OCEANOGRAPHIC ASSOCIATION

Helsinki, Finland

July 26-Aug. 6, 1960

The International Association of Physical Oceanography will hold its XIII General Assembly in Helsinki, Finland on July 25-August 6, 1960, meeting in conjunction with the XII General Assembly of the International Union of Geodesy and Geophysics. The oceanographic sessions of the oceanographic program will open on Wednesday, July 27, with an address by Professor Haakon Mosby, Geofysisk Institutt, Bergen, Norway, President of the IAPO. Following is a list of the themes about which the sessions of the program will be formed:

- Variations in the Overflow of Submarine Ridges
- Ocean Circulation
- Tidal Estuaries
- Topography, Morphology & Geology of the Ocean Floor
- Mean Sea Level
- Storm Surges and Tsunamis
- The Circulation of Carbon Dioxide in the Atmosphere and the Ocean
- Radiant Energy in the Sea
- Comparative Chemical Oceanography
- Physical Chemistry and Geochemistry of Deep Oceanographic Water

Soviet scientists have proposed the formation of a new "Committee on the Dynamics and Morphology of the Littoral Zone." The Russian proposal on this matter will be published in the IUGG Chronicle and will be discussed in a special meeting at Helsinki.

Closing date for titles of papers to be submitted is January 25, 1960, and the abstracts are due by March 1, 1960.

For more information write PROFESSOR B. KULLENBERG, Box 1038, Goteborg 4, Sweden.

corded but one major in the junior class; 10 others reported two.

Happily for the teaching profession, geology as a subject still possesses superb cultural values.

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, J. V. Howell, Co-ordinating Editor, 325 pages, 1957, \$6.00.

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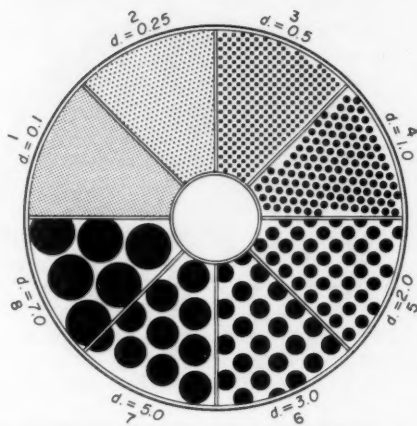
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GRAPH FOR DETERMINING THE SIZE OF SEDIMENTARY PARTICLES DARK COLORED PARTICLES



d. = 10 mm			d. = 15 mm		

DIRECTIONS: Place sand grains or rock particles in the central part of the circle. Compare the size of the particles with those on the graph with the aid of a magnifying glass. Record the corresponding number (1,2,3,4,5,6,7,8) in notebook. For samples with particles of varying sizes, record the predominant size first.

NSF FELLOWSHIPS

The National Science Foundation has announced plans to award approximately 1,100 graduate fellowships and 125 post-doctoral fellowships for the academic year 1960-61 through a program to be administered by the National Academy of Sciences-National Research Council.

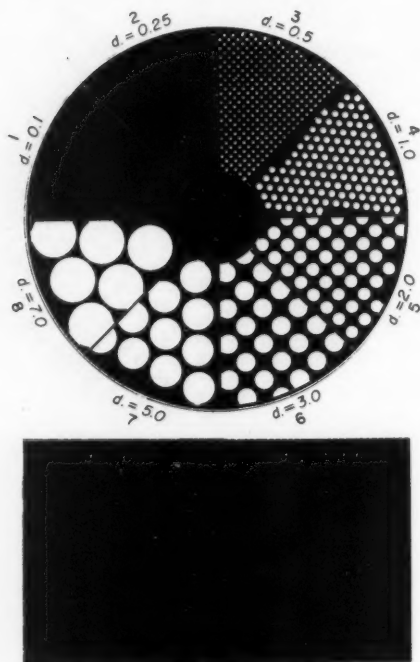
The program is open to citizens of the United States including college seniors, graduates and post-doctoral students and other individuals with equivalent training and experience. A qualifying examination for pre-doctoral award candidates will be

given on January 16, 1960, at designated centers. Awards will be announced on March 15, 1960.

The annual stipends range from \$1800 to \$2200 for the graduate fellows and are \$4500 for the post-doctoral fellows, with limited allowances for tuition, lab. fees, and travel.

Deadlines for filing applications are Dec. 22, 1959, for post-doctoral fellowships and Jan. 1, 1960, for graduate fellowships. For further data and application forms write *Fellowship Office, NAS-NRC, 2101 Constitution Ave., N. W., Washington 25, D. C.*

LIGHT COLORED PARTICLES



REFERENCES: (1) Chilingar, Geo. V., 1956, Soviet Classification of Sedimentary Particles and Vasil'evskiy Graph: A.A.P.G. Bull. 40, No. 7, pp. 1714, 1715. (2) Shvetsov, M.S., 1948, Petrography of Sedimentary Rocks, 2nd ed., 387 pp. Gosgeolizdat, Moscow-Leningrad.

PENNA. EARTH SCIENCE

The Teaching Guide and Course Outline for the new Pennsylvania High School Earth and Space Science course, about 50% of which is geology and oceanography, has now been published by the Bureau of Curriculum Services, Department of Public Instruction, Harrisburg, Pennsylvania. Over 200 Pennsylvania schools are believed to be trying out all or parts of the new course this year, and early reports indicate that the study of minerals and rocks is generating a lot of enthusiasm among the 9th grade students.

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, J. V. Howell, Coordinating Editor, 325 pages, 1957, \$4.00.

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GeoTimes!**

You saw it in GeoTimes . . .

THE STORY BEHIND THE NEW STANDARD SIEVE SPECIFICATIONS is the title of an interesting article appearing in The Testing World available free on request from Soil-test, Inc., 4711 W. North Ave., Chicago 39, Illinois.



BLASTING VIBRATIONS: CAUSE AND EFFECT. 16 mm. Sound. Color. 27 minutes. 1958. Seismologist Don Leet of Harvard discusses explosions and the waves and effects which they produce in different types of rocks. Some unusual slow-motion shots of quarry blasts are included, and waves from blasting are compared with those from horn blowing and other activities to which we are accustomed. Recommended as a non-mathematical and non-technical introduction to the subject of waves that cross the earth's surface. DISTRIBUTOR: Farrell and Gage Films, Inc., 213 East 38th St., New York 16, N. Y.

PREHISTORIC ANIMALS OF THE TAR PITS. 16 mm. Sound. Color or black and white. 20 minutes. 1957. Reviewed by Joe S. Creager. Describes the tar pits and fossils at Rancho La Brea, California. Shows, in miniature, the region and the animals that lived around the pits 30 or 40 thousand years ago, telling of their entrapment and subsequent fossilization, and the methods used to measure, catalog and label their fossil forms. Non-technical. Suitable for high school earth science and elementary historical geology classes. DISTRIBUTOR: Film Associates of California, 10521 Santa Monica Blvd., Los Angeles 25, California. Purchase: black and white, \$62.50; color, \$125. Loan: available from many film libraries.

THE STATE BENEATH US. 16 mm. Sound. Color. 20 minutes. 1957. Reviewed by James H. Zumberge. This film describes the science of geology and tells something of the work of professional geologists. It emphasizes the relationship of geology to economics, with special reference to the state of Indiana, where all of the film was produced. At the start, two geologists examine an outcrop, then later gather additional information by diamond core drilling and seismic shooting. Sequences showing the setting of geophones and exploding of charges are exceptionally good. In the laboratory more is learned through crushing strength tests, spectrographic, chemical and X-ray analyses, thin section studies, fossil identification, and strip log preparation, culminating in the compilation of maps and cross-sections from field and laboratory data. Practical

EMMONS FELLOWSHIP

The S. F. Emmons Memorial Fellowship in Economic Geology is available for the academic year 1960-61, with a stipend of \$1,600.00. Applications and accompanying testimonials should be submitted not later than February 15, 1960.

Applicants should be qualified by training and experience to investigate some problems in Economic Geology and should submit a definite statement of the problems to the Committee, under whose supervision the work may be undertaken at any institute approved by them. The Fellow must give entire time to the problem, which may be used for a doctoral dissertation. *Application blanks may be obtained from the Secretary, Columbia University, Charles H. Behre, Columbia University, Alan M. Bate-man, Yale University, or H. E. McKinstry, Harvard University.*

You saw it in GeoTimes . . .

UMBAUGH-18 is a new autogyro of hybrid design which takes off like a helicopter, but flies like an autogyro.



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applications of such work are then shown by comparing the regional geology of Indiana with some of that state's economic deposits, including coal, oil, building stones, sand, gravel and clay. An excellent film to show the use of geological science in our modern world. DISTRIBUTOR: Audio-Visual Education Center, University of Indiana, Bloomington, Indiana.

STAND UP . . . SPEAK UP . . . SHUT UP . . .

by

S. F. JENKINS¹

"Among 56 directors of science programs listed for teacher-recipients of NSF grants, four only appear to be advisors on geology; two are chemists, one a biochemist, and one is a biologist (presumably). Where are the geologists?"

The foregoing remark, taken from Arthur Bevan's letter in the April 1959 *GeoTimes*, indicates that perhaps geoscientists are not too effective in "selling their product". This failure in salesmanship has been noted by occasional contributors to geological literature for several years. As evidenced by a letter from J. S. Pittman, Jr., in the May-June 1959 *GeoTimes*, it even takes the form of "commission" rather than its usual form of "omission". This example of poor public relations also emphasizes the importance of telling your story so that it cannot be misunderstood.

During the past several years, this writer has listened to several talks a month by geoscientists. Most of these speakers have left the same impression as the foregoing: that as a group, geoscientists do not "sell their product". Although most of these talks were informative and interesting, their effectiveness was reduced after a listener had struggled with "ahs", fidgeting with rostrums or pointer sticks, and mumbling and barely audible low tones on the part of the speaker, to say nothing of disregard by some of them for the time assigned for the remarks. Fellow scientists generously appear to disregard such shortcomings. However, if the speaker were trying to put across a point to someone not already sold on geology, I doubt that he would be successful. Whether one is trying to sell automobiles, or to persuade a college administration that the budget for geological training must be increased, or to obtain research funds from Congress, he is involved in "selling". Whether or not he makes a sale and convinces the other party that his idea should be accepted, will depend upon the effectiveness of his presentation.

Many speakers are undoubtedly unaware that they are reducing the effectiveness

SCIENCE MONOGRAPH PRIZES

Kirtley F. Mather, President of the American Academy of Arts and Sciences has announced three 1960 Monograph Prizes in the amount of \$1000 each, one to be awarded for the best unpublished monograph in the field of the physical and biological sciences. The program aids in stimulating preparation and publication of monographs. A nine man review board evaluates the entries.

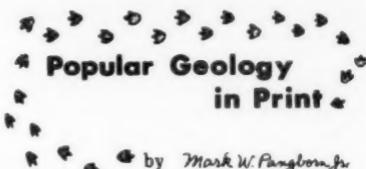
Persons desiring more data on these awards may write: *Committee on Monograph Prizes, American Academy of Arts and Sciences, 280 Newton St., Brookline Station, Boston 46, Mass.*

of their presentations by poor public speaking techniques. It's like the ads used to say: "Not even your best friend will tell you". Fortunately, this situation can be corrected by the individual without too much difficulty. There has been considerable comment lately about whether teachers should be required to take so many courses in teaching techniques or whether they should know their subject. The writer is one of those who believes that a teacher must first have an adequate knowledge of his subject, and that he should also have some knowledge of how to teach or to put his subject across to his pupils.

Many individuals cannot afford to take a Dale Carnegie course in public speaking, however, there are other ways in which one can improve his ability to communicate with others. Toastmaster Clubs throughout the world (particularly in the English-speaking areas) have aided many thousands of men to develop their ability to speak more effectively before audiences. Many business and professional men have found that their ability to talk to others has been greatly improved by membership in a Toastmasters Club. Even those individuals who have had considerable public speaking training in school find that they profit by experience in Toastmasters.

Occasional articles in the daily press or courses on TV (as mentioned in the April 1959 *GeoTimes*), while they are to be commended, are a "drop in the bucket" in the National picture. If the geosciences are to take their proper place in our society, it is essential that all geoscientists "sell their product" whenever they have the opportunity. To accomplish this, it is necessary that each individual learn to Stand Up, Speak Up, and Shut Up.

¹LT. COL. S. F. JENKINS, USMC, 7109 Saroni Drive, Oakland 11, California.


**Popular Geology
in Print**
 by Mark W. Pangborn, Jr.

GEMSTONES OF NORTH AMERICA (Van Nostrand, 1959, \$15), by talented amateur mineralogist **John Sinkankas**, is the last word on the subject for rock hound, jeweler, and gem dealer; if there might not be quite enough technical detail for the professional mineralogist, the abundance of historical and location information will please everyone. This handsome, well-illustrated volume covers a wide range of gems, from the diamond to many odd or soft stones, pearl, coral, and jet; a glossary, good bibliography, and fine geographical and general indexes are provided.

We don't know why a book should be cast in question-and-answer form, but mineralogist **Richard M. Pearl's** **1001 QUESTIONS ANSWERED ABOUT THE MINERAL KINGDOM** (Dodd, Mead, 1959, \$6), is an informative example of the genre, for ages 13 up. The questions are arranged in chapters, by subject, well indexed, and "mineral kingdom" is broadly interpreted to include such fields as mining, fuels, industrial minerals, and water resources; there is a classified bibliography, which, unlike most of Pearl's reading lists, is unfortunately not annotated; occasional illustrations. **Herbert S. Zim's** **DIAMONDS** (Morrow, 1959, \$2) describes, for ages 8 to 14, the history of diamonds, their occurrence in nature, properties, cutting, and uses; like most of Zim's work, this book is lucid, informative, and illustrated with intelligence and skill.

In **THE STORY OF EARTH SCIENCE** (Lippincott, 1959, \$3.75), geologist **Horace G. Richards** provides an "armchair" introduction to rock, mineral, and fossil collecting for the novice, age 14 up; not a recognition book for field use, this volume attempts to demonstrate the pleasures of collecting, and to place rocks, minerals, and fossils in their proper geological setting. A more extensive annotated bibliography, arranged by subject and including at least some of the regional titles now available, would add greatly to the book's value; format and illustrations are disappointing.

Older children and uninitiated adults will enjoy **C. B. Colby's** **MAPPING THE WORLD** (Coward-McCann, 1959, \$2), an interesting picture book with accompanying text, depicting Army Map Service per-



ROCK CHIPS

by SANDSTONE SAM

A geology major in a southwestern school was helping in the induction of new members into Sigma Gamma Epsilon, the geology honorary fraternity. He read the part of Werner. The year before he had participated in the program as an inductee. When one of his professors chided him at not being able to identify Werner in an exam after participation in this ceremony the student replied, "But Prof., you know I was sworn to secrecy."

* * *

Question: In which direction does a contour line bend when it crosses a stream?

Student Answer: A contour line always bends downward toward the south or if the stream is sideways it crosses east or to the left.

* * *

Status Quo: This mess we're in!

* * *

To Expedite: To confound confusion with commotion.

Expediter: One who expedites (as above) by riding fast trains, champagne flights, staying in good hotels, and entertaining lavishly.

* * *

The sweet young thing after a guided tour of the Dinosaur National Monument quarry asked brightly, "Sir—what do you do with all these bones in the winter?"

sonnel at work all over the globe, and emphasizing the newest geodetic, photogrammetric, and publishing gadgets. Unfortunately, the rôle of other agencies in national mapping has been carefully ignored, giving Colby's volume a chauvinistic flavor which seems out of place in a youngster's book.

The numerous geologists who interpreted photos during World War II will delight in **Constance Babington-Smith's** **AM SPY** (Ballantine Books, 1959, \$.50), a fascinating history of photo-intelligence in the European theatre, now available in cheap reprint.

Fine for boys and girls 8 to 12 is **Sam and Beryl Epstein's** **THE FIRST BOOK OF MAPS AND GLOBES** (Watts, 1959, \$1.95), an informative, well-illustrated little book on the making, use, and reading of maps; brief glossary and bibliography.

GEOLOGY IN NORWAY

—Continued from page 9

- book) Naturvitenskapelige rekke (before 1948: Bergens Museums Arbok).
- 5) Det Kongelige Norske Videnskabers Selskab, Trondheim. a) *Skrifter* (mostly monographs). b) *Forhandlinger* (mostly short articles).
 - 6) Tromsø Museum, *Acta Borealis A. Scientia*.
 - 7) *Norsk Geografisk Tidsskrift*. Published by Det Norske Geografiske Selskap, Oslo.
 - 8) Norsk Polarinstitut (before 1948: Norges Svalbard og Ishavsundersøkelser) *Skrifter* (Scientific Studies from Arctic regions, especially "Svalbard", the Spitsbergen Islands etc., and from Antarctica.)

Without going into details and without mentioning any names a brief survey of the trends and results of Norwegian geological research will be given.

More than a hundred years ago a Norwegian geologist wrote that gneiss and granite might form by alteration of a solid pre-existing rock without aid of a liquid phase. The further development of these ideas was long suppressed by a significant progress in the interpretation of magmas and their crystallization on physico-chemical bases, and the consequent emphasis on eruptive rocks. In later years Norway has been a leading country in the investigation of metamorphic and metasomatic processes. It should be noted that most of the younger Norwegian geologists are so cautious of not committing themselves in classifying rocks as primary magmatic. It may be rightly claimed that some have gone too far in this direction, and that i.g. primary sedimentary features in some cases may explain rock variations that are now attributed to metamorphic differentiation.

Geometrical and structural studies were well advanced a few generations ago. As this branch of investigation after a regretably long period of inactivity again is on the rise, one may notice how the old, bold interpretations receive new actuality and new results emerge.

The regional mapping of the country advances slowly: the country is large, geologists are few, and many tracts are not easily accessible; in places adequate topographical maps are lacking. The rather small Geological Survey has for many years worked under difficult conditions. It tries to add to its efficiency, for example by employing university teachers and students for summer work and by leaving the in-

vestigations of certain areas to the university geologists.

CALEDONIAN INFLUENCE

The Caledonian mountain chain forms the backbone of the geology of Norway. It has influenced pre-Cambrian, eo-Cambrian, Cambro-Silurian and Devonian rocks. Only parts of southeastern Norway and the interior of Finnmark (in Northern Norway) escaped essential Caledonian deformation.

Within the pre-Cambrian areas the contours of a stratigraphical system are now visible in some of the least metamorphic parts. In other parts studies of anorthositic, banded gneisses, scapolitized rocks, etc. have given valuable contributions to the understanding of many petrographical problems.

In northern and southern Norway eo-Cambrian sedimentary beds with tillites deposited on a glaciated basement, underlie the fossiliferous Cambro-Silurian strata. A special program on "The Middle Ordovician of the Oslo Area" was initiated after World War II and has rendered interesting new results.

Petrographical and structural studies currently clarify the picture of the Caledonian mountain chains. Along a cross section starting in southeast one meets with peripheral folds within the Cambro-Silurian cover on an undeformed pre-Cambrian basement. Towards west and northwest there are various maps, some of them containing pre-Cambrian rocks, followed by rocks that have suffered a deep-seated recrystallization, partial granitization, frequently plastically deformed.

PERMIAN VOLCANISM

The Permian volcanism and the associated sub-volcanic rocks of the Oslo graben were long the most famous geological features of Norway. Work in this area has been continued and a new series of publications with special emphasis on the mineralogy and petrology have been published. The many cauldrons are one of the significant new features.

Triassic-Jurassic, Cretaceous, and Tertiary rocks are absent or very scarce in Norway proper, but they are well represented in Spitsbergen. In Tertiary time Norway received the contours of the present time, inter alia by the formation of fissure lines along the coast as shown by studies of the submarine relief.

The idea that Norway once was covered by ice was proposed by a Norwegian university geologist 135 years ago. The U-shaped valleys and fiords testify to this, as well as the large terminal moraines, the er-

GEOLOGY IN FRENCH

This semester in the Department of Geology of the University of Illinois a course in Alpine structural geology is being taught in French by Professor Albert V. Carozzi to a class of ten advanced graduate students. These students have already passed the required French reading examination for the Ph.D.

The course, meeting twice a week, is designed not only for specialized training in structural geology but also to enable students to go beyond the ability to read French to the ability to understand oral discussion of geological topics.

Professor Carozzi emphasizes the statement that the course is not primarily a course in language, but is primarily a course in Alpine tectonics; it has the additional objective of enabling students to discuss French and Swiss geology in the language in which the reports are written.

The students take most of their notes in French with side notes in English or conversely.

You saw it in GeoTimes . . .

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ratic boulders, and the raised beaches. Much work has been devoted to Pleistocene geology. The history of deglaciation from the coastal areas up to the high mountains is being investigated in many new ways, for example by a set of quarternary geological maps covering a large part of southeastern Norway. Progress has been made concerning the problems of landslides.

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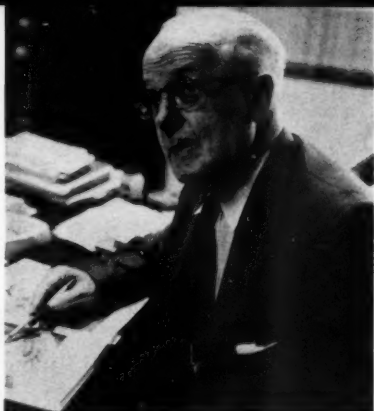
GEOLOGY

*In the
Public Eye* by
Robert L. Bates

Robert L. Bates, Department of Geology
Ohio State University, Columbus, Ohio

The Oregon Museum of Science and Industry in Portland is really making science alive and exciting, especially for the younger folks. OMSI sponsors six junior science clubs, and schedules school visits, teacher visits, and career counseling. It also runs what is described as the first youth camp in the U.S. devoted to teaching geology and paleontology, in the fossil-rich hills of eastern Oregon. Last summer the camp had a capacity enrollment of 125 youngsters. Instruction is by geologists of the northwest, who each give a week or so of their time. But the most successful of the Museum's activities seems to be the Saturday bus trips. These take young people to such places as the high slopes of Mount Hood (life at the timberline), a cove on the seashore (marine life), and a fish hatchery (to see the fish hatch, natch). One of the July trips, for students in fifth grade through high school, was into the Columbia River Gorge, where the geology was described by Ralph Mason of the state's Dept. of Geology and Mineral Industries. In August, geologist Paul Howell of the Army Corps of Engineers took a group, grades 7 through 12, on a collecting trip to the Oregon City area, "to see how this area was formed and to secure samples of rock that depict the geological history."

... This seems to be mostly an Oregon column. Our attention has been directed (by a resident of Virginia) to Bulletin 50 of the Ore. Dept. of Geology and Min. Ind., a 148-page guide to trips along the state's highways. Prepared for the College Teachers' Conference in Geology, at Corvallis last June, the bulletin includes a brief general discussion, road logs of seven trips, and an extensive bibliography. It is lavishly illustrated, with two center pages of color photos. This is a good item for the geologist's library as well as the layman's. Price, \$1.50 . . . Geology of the Roman Nose State Park is described in the Oklahoma Survey's Guidebook 9 . . . For younger readers, the Illinois Survey has issued a new *Guide to Rocks and Minerals of Illinois*, and the Indiana Survey has a booklet, *Adventures with Fossils*. Both are illustrated, and well keyed to occurrences in the appropriate state. Seems as though the plains states outdo the mountainous ones in this kind of thing. Wonder why?



NEW AGI OFFICERS

At the meeting of the Board of Directors of the American Geological Institute held on November 4 at the annual meeting of the Geological Society of America in Pittsburgh, the following slate of officers was elected for the year 1960.

President: Dr. Raymond C. Moore, whose numerous and varied contributions to the geologic profession are widely recognized. For many years he was director of the State Geological Survey and chairman of the Department of Geology of the University of Kansas where, just a year ago, he was appointed Distinguished Professor, the first such appointment to be made there. Dr. Moore has served as President of the Commission on Stratigraphy of the International Geological Congress since 1952 and in 1958 served a term as President of the Geological Society of America. He holds, among the many honors and awards bestowed upon him, the Sidney Powers Medal, top award of the American Association of Petroleum Geologists.

Vice-President: Dr. Ian Campbell, who early in January, 1959, became chief of the California Division of Mines. Prior to his appointment, Dr. Campbell had been a faculty member of the department of geology at the California Institute of Technology. He has become widely known throughout the profession for his many services to the scientific societies in which he holds membership. He has been a member of the Executive Committee of the



President	Raymond C. Moore	(upper left)
Vice President	Ian Campbell	(upper right)
Secretary-Treasurer	Donald H. Dow	(lower right)

Western Governors Advisory Council since 1954. He has served AGI previously as a director.

Secretary-Treasurer: Donald H. Dow was once again reelected to this office which he has held since 1956. Mr. Dow as a member of the staff of the Geologic Division of the U. S. Geological Survey, has recently been appointed as Chief of the Military Geology Branch.

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THE GEOLOGICAL SOCIETY OF AMERICA ANNOUNCES NEW MEMOIRS

Memoir 77 **RELATION OF ORE DEPOSITION TO DOMING IN THE NORTH AMERICAN CORDILLERA.** By Edward Wisser. Approximately 140 pages, 34 figures. Expected date of issue: January 25, 1960

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Prices: To Nonmembers of GSA on orders received <u>after</u> January 25	\$4.00	<input type="checkbox"/>
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Memoir 78 **MOLLUSCAN FAUNAS OF THE FLAGSTAFF FORMATION.** By Aurele La Rocque. Approximately 150 pages, 2 figures, 4 photographic plates. Expected date of issue: February 1, 1960

A study of nonmarine mollusks of the western interior. The author uses the record of the animal life in the strata to interpret the changing environment and to determine the history of lakes from inception to extinction.

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Memoir 79 **ROCK DEFORMATION.** David Griggs and John Handin, Editors. Approximately 430 pages, 40 photographic plates, more than 150 figures. Expected date of issue: February 25, 1960

Contains 13 papers presented at a Symposium on Rock Deformation, held at the Institute of Geophysics at UCLA, by theoretical and experimental leaders in the field. Gives recent results of active workers in experimental rock deformation and includes new theoretical contributions.

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Secretary's Note:

Especially to dispel reported erroneous assumptions that publications of GSA are not available to nonmembers, the Society turns for the first time to this form of advertising in announcing new volumes. Note List Prices above and special discounts on prepublication orders. For prices on other volumes in stock see price lists on current Bulletin covers.

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ROCKY MOUNTAIN SECTION, A.A.P.G.

Geologists of Billings, Montana will be host to the annual Rocky Mountain Section meeting of the American Association of Petroleum Geologists to be held February 7-10, 1960. It is expected that over 1000 geologists from throughout the Rocky Mountain Empire will attend.

The theme for the annual event is "Future Exploration After a Decade of Progress." Approximately 33 technical papers will be presented by prominent geologists from the Rockies.

It is announced that social events for the meeting will include the President and General Chairman's reception Monday evening February 8 and a social hour and dinner dance on Tuesday evening. A special program has been planned for the ladies.

General chairman for the meeting is James O. Staggs, Division geologist for McAlister Fuel Company, Billings.

ROCKY MOUNTAIN SECTION, G.S.A.

The Rocky Mountain Section of the GSA is meeting at the South Dakota School of Mines in Rapid City, April 28-30, 1960, according to Chairman J. O. Harder of the Homestake Mining Co., Lead, S. Dakota. He states that an interesting program and several field trips are being planned.

Program Chairman Allen F. Agnew of Vermillion, S. Dakota State Geologist, says that a symposium of invited speakers on earthquakes is being planned. In addition, special emphasis will be given to papers on engineering geology. Papers on other geologic topics will, of course, be welcome. Preliminary abstracts are needed by February 1, and abstracts in final form by March 1, 1960.

Further information can be obtained from Secretary, J. P. Gries at the School of Mines.

WANTED: Volunteer Abstracters

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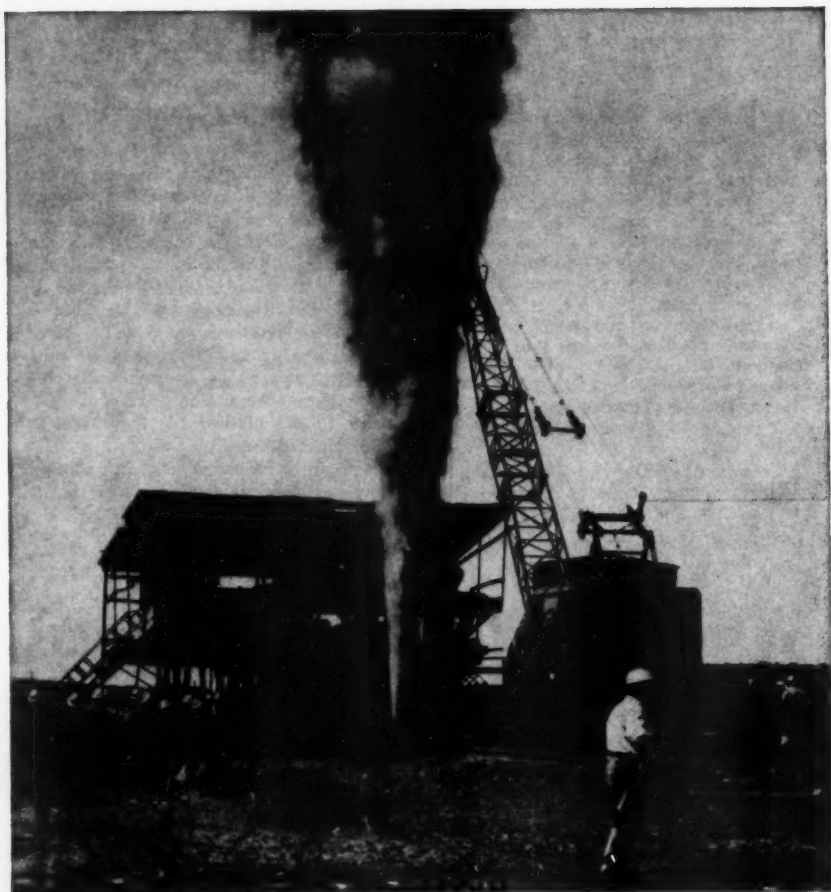
Last month, GeoTimes reported on the need for assistance in improving the coverage of GeoScience Abstracts. The response was good and there is now the nucleus of what is necessary for the effectiveness of any truly comprehensive and prompt abstract service—qualified professionals who regularly scan and abstract as necessary the literature of a particular field, area, or journal. More interested and qualified geologists are needed to see to it that useful geologic information is not overlooked by large segments of the profession because no one took the trouble to prepare a meaningful abstract.

Some group, or specialist, is needed to insure good abstract coverage in the field of vertebrate paleontology. Although one of the mottos of the military geologists is "Hush," they occasionally have a word to say that is not classified. Many geologic societies regularly publish field-trip guidebooks, or collections of symposia, and a great service would be performed by any member of a society who would volunteer

to see that such publications of his society were reported, in abstract form, to GeoScience Abstracts.

Of course the largest discrete field in which geologists can help is providing coverage of specific journals. Volunteers are needed from readers of World Oil, Science, Oil and Gas Journal, the Canadian Mining and Metallurgical Bulletin, the Canadian Mining Journal, and Scientific American. There are many other journals for which arrangements should be made for regular scanning and reporting as necessary. If you are willing to help, but your "pet" journal hasn't been mentioned, the Managing Editor of GeoScience Abstracts would probably be more than pleased to make it your assignment.

If you can offer assistance toward providing abstracts coverage in any of these fields you are urged to write to MARTIN RUSSELL, Managing Editor, GeoScience Abstracts, American Geological Institute, 2101 Constitution Avenue, N.W., Washington 25, D. C.



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LESLEY

—Continued from page 19

With a Survey budget of about \$50,000 per year, the quantity of published reports which his organization produced was tremendous. In the 14 year period from 1874 to 1887, Lesley's group of geologists published 77 volumes of text and 33 atlases, plus a Grand Atlas of Pennsylvania. Many of these reports are much used today, for not since that time have state-wide investigative efforts been so wide-ranging. Indeed, the new areal geological map of Pennsylvania which has just been compiled (and which is in the process of being printed), makes use of a large number of Second Survey maps for the reason that there has been no more detailed mapping done in large areas of the state in the last 80 years. The extent of the area investigated and reported on by Lesley and his colleagues in a relatively short time is awesome. But, because he believed in individual responsibility and expression, and therefore gave free rein to his geologists, many of whom were still apprentices in the profession, there are some glaring inconsistencies and a wide range of quality in the reports. Lesley himself pointed out some of these deficiencies while fulfilling his editorial responsibilities. Indeed, he felt it his responsibility to comment editorially on every published report.

This tremendous work load was hard for him to bear. The strain of his work prevented him from taking on more remunerative jobs, and although he longed to avoid that which was routine in his job, he could not bring himself to delegate much responsibility to others, while his conscience and the urge of accomplishment drove him on. Never a strong or robust man, he interspersed his Survey work with vacation trips to Europe—8 such in 14 years, and in spite of the load he carried, he never lost for long his sense of humor or his excitement with new ideas. From Paris once, he wrote in good humor of the possibility of classifying an intriguing subject, chimney pots—for he estimated that there were "at least some twenty genera and two hundred species" of them.

Near the end of his Survey career he produced "Volume X", a great work which was a compendium of geologic maps of the 67 counties in the state, each accompanied by a brief text. This work was all the more remarkable because it was compiled from such varied sources as notes, recollections and scraps of paper—all to be put down on base maps for which the control was far from perfect, and interpolation and extrapolation were a large

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part of the job.

As his last official task he wrote a three volume Final Report of the Second Survey which was a Summary Description of the Geology of Pennsylvania. It was while he was thus engaged that his stamina began to fail for the last time. Even then, however, he had moods of heady optimism—"I have safely explored and passed up through the Azoic Hell, the Cambrian Purgatory, and six lower heavens. I am now flying merrily through the Seventh Heaven, called the Oriskany". But at about the same time he also noted—"It will be the chief failure of my life". In reviewing this opus, Geikie commented enthusiastically, "The vigorous writing especially delights me, for geologists, as a rule, never cultivate literature, but express themselves in the most slovenly way".

By 1893 Lesley had spent himself and in failing health he and his wife returned for their last years to Milton, Mass. There he died on June 1, 1904.

William Morris Davis, whose excellent biographical memoir of Lesley was printed by the National Academy of Sciences and served as a source for much of this brief accounting, characterized the bygone days as those when, in geological discussions and controversy, "confident assertion replaced demonstration". "Today" (1915), he continues, "geology has advanced in discipline and in content, but it must not be forgotten that the advance has been made by successive approaches closer and closer to the truth, and that among those who have contributed immensely to the advance was the vehement Pennsylvanian."

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By FRANCIS J. TURNER and JOHN VERHOOGEN, both of University of California, Berkeley. Ready in January.

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The book concentrates on the structure, nature, and properties of inorganic crystalline solids. It begins with a thorough, although brief, discussion of elementary crystallography. It then considers how crystals form, how they grow, how they can be deformed elastically and plastically, how they interact with each other, and the different forms in which they can exist. Next the principles of quantum mechanics are considered in a very elementary way, and then the results are applied to three kinds of solids: metals, semiconductors, and insulators.

INTRODUCTION TO GEOPHYSICAL PROSPECTING, Second Edition

By MILTON B. DOBRIN, Triad Oil Company, Ltd., Calgary, Alberta, Canada. Ready in January.

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OPTICAL MINERALOGY

By PAUL F. KERR, Columbia University. New Third Edition. 422 pages. \$8.50.

This book explains the use of the polarizing microscope in the study of transparent minerals. The optical properties of common minerals are given, and the optical principles are explained. Tables are provided to aid identification. The book is intended as a text for laboratory classes in optical mineralogy and as a useful reference book wherever the polarizing microscope is employed.

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LESSONS IN SEISMIC COMPUTING, *Morris Miller Slotnick, Edited by Richard A. Geyer, 1959, Society of Exploration Geophysicists, Box 1536, Tulsa, Oklahoma. \$5.00 in U. S., \$6.00 elsewhere.*

This volume, a memorial to Dr. Morris Miller Slotnick, former editor of *Geophysics* (1936-1939), is in essence an elementary text and problem book covering the fundamentals of applied reflection and refraction seismic computations and interpretations. Its study and use as a reference by the practicing geophysicists in the field of applied seismology is highly recommended.

Dr. Slotnick's presentation of the subject matter in the compiled series lessons reflects his ability as a genuine teacher and one who had a "unique pedagogical philosophy." He was not only interested in satisfying the desire of his co-workers to learn more of what they were doing, but also equally interested in establishing a logical means whereby seismic data may be translated into terms "essential for the geological understanding of the subsurface." This Dr. Slotnick has accomplished.

As one reads Dr. Slotnick's presentation of the lessons and the problems, along with his informal letters describing the progress which the student should be making, one cannot help but feel the warmth, the humility, the deep concern this man had for his fellow worker.

L.S.

TECTONIC SKETCH MAP OF NORTH AMERICA by *W. Taylor Thom, Jr., scale 1:10,000,000, size 27" x 38", Available from YBRA Inc., 14 Guyot Hall, Princeton, N. J. \$2.50.*

This tectonic map shows regional structural features and approximate configuration of the surface of the basement complex. A special inset map shows the relation of the Williston Basin to nearby tectonic provinces. Prepared by the author in cooperation with the Yellowstone-Big Horn Research Association.

BASIC RUSSIAN-ENGLISH GEOLOGICAL DICTIONARY, compiled by *V. G. Telberg and T. Deruguine, 67 pp., 1959, Telberg Book Co., 544 Sixth Ave., New York 11, N. Y., \$10.00 (200 copies available).*

The earth scientist who reads no Russian would hardly comprehend a U.S.S.R.

Academy of Sciences publication in his particular field with the aid of a 1,000-word dictionary-like key. His Russian-reading counterpart would be little aided by the overabundance of transliterated terms, needing only glossary explanation if any at all, and of stratigraphic names, also transliterations. Unfortunately, the need for a Russian-English geologic dictionary is great, and this slim volume does not constitute more than a short step toward filling that need. It does, however, contain a list of Russian abbreviations and earth-science institutions which may, although incomplete, prove to be most helpful.

G.E.D.

SUCCESSFUL TECHNICAL WRITING, by *Tyler G. Hicks, 297 pp. index, 1959, McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y.*

Written by an engineer, primarily for engineers, this manual will seem to geologists to be expressed in unfamiliar terms and illustrated with graphics far afield from their interests. It is, however, a comprehensive introduction to the art of technical writing and instructs on the mechanics of preparing articles for business and trade magazines, company reports, instruction and training manuals, industrial catalogs, technical papers for professional journals, and technical books. It will appeal more to novice writers who need advice on how to get started and to practicing scientists who should write but haven't, than to scientists who have written and need a reference manual.

M.R.

CONTRIBUTIONS IN GEOPHYSICS, vol. I, edited by *Hugo Benioff, Maurice Ewing, Benjamin F. Howell, Jr. and Frank Press, 244 pages, 1958, Pergamon Press, New York, N. Y. Price \$9.00.*

The 17 important papers which comprise this volume were assembled in honor of Beno Gutenberg and published at a time approximating his retirement as Director of the Seismological Laboratory of the California Institute of Technology. The contributions encompass many fields of current research in solid earth physics: "The energies of seismic body waves and surface waves" by Marcus Bath, "Energy in earthquakes as computed from geodetic observations" by Perry Byerly and John D. Noyer, "The variation of amplitude and energy with depth in Love waves" by Robert Stoneley, "About some phenomena preceding and following the seismic movements in the zone characterized by high seismicity" by Pietro Caloi,



PETROLEUM GEOLOGY, Second Edition

By KENNETH K. LANDES, *University of Michigan*. The geological occurrence of oil in the earth's crust and how commercial deposits of that oil can be found by man is the main theme developed here. Using the terminology of the geologist and the philosophy of the practical oil man — the author discusses the modern theories of the origin and evolution of oil and gas, the rocks which contain oil and gas, the associated fluids in the reservoirs, the seals which retain the fluids in the reservoirs, the migration of hydrocarbons through the rocks, and the various types of traps in which commercial deposits occur. Also includes background material on how oil and gas wells are drilled and produced. 1959. 444 pages. Illus. \$9.50.

THE SEA OFF SOUTHERN CALIFORNIA

A Modern Habitat of Petroleum

By K. O. EMERY, *University of Southern California*. Seeking to integrate and summarize the basic knowledge available about marine geology and underwater oil sources, Professor Emery studies the many components of the ocean (physiography, structure, water, life, and sediments) and shows their relationship to the origin, migration, and accumulation of petroleum. He has compiled data that sums up the extensive research that has been conducted of the sea floor region of Southern California — an area where much work has been done, but few published accounts exist. *Ready in January. Approx. 384 pages. Prob. \$12.50.*

ATLAS OF LITHOFACIES MAPS

By L. L. SLOSS, E. C. DAPPLES, and W. C. KRUMBEIN, *all of Northwestern University*. This Atlas represents the results of more than ten years of work by the authors and their students on Paleozoic and Mesozoic strata, their thickness, distribution, and lithologic character. The maps clearly show the distribution, thickness, and lithologic aspect of approximately 150 selected rock- and time-stratigraphic units in the United States and Southern Canada. The combinations of isopachs and facies lines provide major shelf, basin, and geosynclinal conditions during deposition of each unit. The Atlas offers a convenient reference for comparing the history of deposition during different episodes in the same general region. 1959. *In press.*

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"Zur Mechanik und Dynamik der Erdbeben" by Wilhelm Hiller, "Direction of displacement in western Pacific earthquakes" by J. H. Hodgson, "On seismic activities in and near Japan" by Chuji Tsuboi, "Solidity of the inner core" by K. E. Bullen, "On phases in earthquake records at epicentral distances of 105° to 115°" by I. Lehmann, "Quelques expériences sur la structure de la croûte terrestre en Europe occidentale" by J. P. Rothé, "Seismic observations at one kilometer depth" by H. E. Tatel and M. A. Tuve, "Interpretation of the seismic structure of the crust in the light of experimental studies of wave velocities in rocks" by Francis Birch, "The free oscillations of the Earth" by C. L. Pekeris and H. Jarosch, "The geophysical history of a geosyncline" by F. A. Vening Meinesz, "Some recent studies on gravity formulas" by W. A. Heiskanen and U. A. Uotila, "Data processing in geophysics" by H. E. Landsberg, "Geomagnetic drift and rotation of the earth" by Walter Elsasser and Walter Munk.

NEW INSTRUMENTS AND METHODS OF ENGINEERING GEOLOGY, 1959, by N. V. Glazov and A. N. Glazov, 91 pp., translated from Russian, Consultants Bureau, Inc., New York. \$3.25.

This book describes selected techniques and laboratory apparatus as applied in the USSR to soils engineering—not engineering geology as the title implies—with much emphasis on the use of radioactive isotopes.

While the book appears to be of interest to the research scientist working in soils engineering, soils physics, and hydrogeology, it does not contain the type of information useful to the engineering geologist in the field.

A.H.N.

WATER FACTS FOR THE NATION'S FUTURE, by Walter B. Langbein and William G. Hoyt, 288 pp., 1959. The Ronald Press Co., New York. \$5.00.

Helpful to geologists, geophysicists and others on the "fringes" of hydrology is this complete book of facts on the nation's water facts. No need any longer to wonder what data are available or whether they are adequate; this authoritative analysis covers the uses and benefits of all known hydrologic data programs.

A review of data programs—their origins and deficiencies—fills Part I. How data is put into action, with helpful examples, keynotes Part II. Data for decision is the central theme of the book, which fills a definite gap in the literature.

Among the new ideas for getting more mileage out of the basic-data dollar are: a hydrologic clearing house or central office of hydrologic intelligence, and handbooks for helping professionals and laymen apply basic data to water problems. The users of data are challenged to develop new relationships that can expand the usefulness of the mountains of data already at hand.

The authors' combined 65 years of experience in hydrology enable them to answer affirmatively three focal questions: 1) existing programs, in general, are providing the right data, reasonably fast, and with good efficiency; 2) routine fact gathering is here to stay but mere quantity should be deemphasized in favor of improved quality; and 3) better use of available data is the fruit of further effort by all who deal with water facts.

D.V.T.

CLAYS AND CLAY MINERALS, PROCEEDINGS OF THE SIXTH NATIONAL CONFERENCE ON CLAYS AND CLAY MINERALS, edited by Ada Swineford, 411 pp., Pergamon Press Inc., 122 E. 55th St., New York 22, New York. \$8.50.

This is the collection of papers presented at the Sixth Annual National Clay Conference, containing much recent work in the science; twenty-eight papers and a field trip itinerary are presented. Alteration of feldspars, changes in clays during various processes, clay mineralogy of some soils and rocks, and structural studies are presented. An excellent reference book for workers in the field.

ELEMENTS OF X-RAY DIFFRACTION, by B. D. Cullity, 514 pp., Addison-Wesley Publishing Company, Inc., Reading, Mass.

As the title indicates, this is a textbook designed for students beginning work in X-ray diffraction. Therefore the book treats the subject progressively from the properties of X-rays and crystals, through their inter effects. Experimental methods are covered in chapters on Laue and powder photographs and diffractometers. Applications are covered in ten chapters. Problems are contained with each chapter. A short discussion of fluorescence comprises one chapter.

CONSERVATION AND USE OF NATURAL RESOURCES, 1959-60 POLICY DECLARATIONS, available on request from the U. S. Chamber of Commerce, 1615 H St., N. W., Washington 6, D. C.

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FIRST ISSUE SCHEDULED FOR NOVEMBER 1959

TV SCIENCE

—Continued from page 85

- From Crust to Core
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- Caves
- Rocks, Minerals and Gems
- Stories in the Rocks—How We Know
- Prehistoric Plants and Animals
- Climates of the Earth
- Glaciers—Today and Long Ago
- The Layer of Soil
- Living Things and the Changing Surface of the Earth
- Water and Wind and the Changing Surface of the Earth

As with the other series, scientists from the Washington area were called upon to help in reviewing the lesson plans, to provide specimens, props, and facts, and in many cases to appear as guests of the studio teacher. Area 3, Man's Utilization of his Environment, also included some geology in discussions of the search, use, and conservation of natural resources.

Originally a two year cyclical program was planned, with the second part of the cycle to include "Living Things" and "Physical and Chemical Forces". The second year of the cycle went on the air September 28, 1959.

Of the Friday programs which went with the first three areas, the following have the greatest earth science "flavor":

TITLE	PARTICIPANT AND AFFILIATION
<i>Weather</i>	Joseph Smagorinsky, U. S. Weather Bureau
<i>The Study of Layered Rock</i>	Thomas J. Dutro, Jr., U. S. Geological Survey
<i>Rivers</i>	Luna B. Leopold, U. S. Geological Survey
<i>Crystals</i>	Edwin Roedder, U. S. Geological Survey
<i>The Mud On Your Shoes</i>	Victor J. Kilmer, U. S. Dept. of Agriculture
<i>Geologic Time</i>	Lorin Steiff, U. S. Geological Survey
<i>The Last 500,000,000 Years</i>	Frank Whitmore and Allison Palmer, U. S. Geological Survey
<i>A Look at Glaciers</i>	William E. Davies—U. S. Geological Survey
<i>Experiments in Geology</i>	Hans Eugster, Carnegie Institution
<i>Oceanography</i>	Feenan D. Jennings, Office of Naval Research
<i>Volcanoes</i>	Charles Anderson, U. S. Geological Survey
<i>The Size and Shape of the Earth</i>	Paul D. Thomas, U. S. Coast and Geodetic Survey
<i>Earthquakes</i>	Leonard Murphy, U. S. Coast and Geodetic Survey

Although adequate copies and distribution procedures are not yet available for the films of these shows, it is suggested that those individuals interested in using any of them write direct to GWETA, Suite

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922, Raleigh Hotel, Washington 4, D. C., so that they may be notified when the films do become available. Some of the organizations which provided participants now own prints of these films which may also become available for distribution. One of these films, "Volcanoes", complete with Russian soundtrack provided by the U. S. Information Agency, is now being shown at the United States exhibit at the Moscow fair.

As GWETA enters its second year of in-school programming, it is anticipated that many science specialists in the Washington area will take part in further Friday presentations. It is only through this medium of educational TV (and film) that an individual earth scientist can reach thousands of youngsters, to stimulate an interest and enthusiasm for the work that he is doing.

LETTERS

DEAR EDITOR:

I was interested to read in an article in the September issue of *GeoTimes* that Professor Roman Kozłowski of the University of Warsaw had proved that graptolites are hemichordates. He may have proved this to the satisfaction of some scientists but he certainly has not proved it as far as Dr. Libbie Hyman is concerned. In her recent book "The Invertebrates," Volume 5, Dr. Hyman concludes a discussion of the zoological affinities of graptolites with the statement, "The inclusion of graptolites in the Hemichordata is therefore here rejected as insufficiently grounded."

ROBERT L. HELLER
Duluth, Minn.

DEAR SIR:

I would be very grateful if you could publish an appeal for help in favor of the department of geology of the University of Khartoum.

I came here one year ago from the University of Chicago, as a lecturer in Geology. The department had been established in the beginning of 1958, under the directorship of Prof. A. Azzaroli, of Florence, Italy. Teaching however has not started until now. During the past academic year, 1958-59, no students registered for the geology degree, partly because the new course of study had not been properly advertised among them. That gave us the opportunity not only to do some research of our own, but also to put together some of the most necessary equipment for laboratory and field research and teaching, such as microscopes, Bruntons, magnifiers, etc. A good deal of last year's budget had also to be devoted to the purchase of a four-wheel drive vehicle, to ensure staff and students a certain degree of autonomy in carrying out field work.

Now that classes have started, we are finding ourselves very short of illustrative material. There are only two geological maps in the Library which could be used in teaching map reading. Unfortunately, our present financial situation is not bright. The departmental budget has been cut considerably, not only for this academic year, but also for 1959-60. There is very little money to buy maps, textbooks and other equipment.

It would be very appreciated indeed if anyone could send us geological maps,

particularly any that can be used by the students; postcard-size photographs of geological phenomena, spare copies of elementary and advanced textbooks. The books should be sent to the Library, the other material to the Department of Geology.

The students who take geology this year will be the first Sudanese geologists to graduate in the Sudan. Most of them will be employed by the Geological Survey, which is planning a considerable expansion for the next few years. There will be no doubt other openings with private, especially foreign, enterprises, since the government is encouraging interest in the undeveloped mineral resources of the Sudan. The country is very large and geologically still mostly unexplored. Sudanese geologists have much work ahead of them.

I am sure any gift of books and maps will contribute much to their training; not little to create good will and understanding between the Sudan and our country.

Thank you very much.

Sincerely yours,

J. SESTINI
Lecturer in Geology
University of Khartoum
Khartoum, Sudan

DEAR EDITOR:

"Many a geologically-trained wife of a professional geologist will be envious of Dr. Maxine Langford Abbott, who recently was awarded an NSF grant..." *GeoTimes*, Sept. 1959, p. 22. I am a geologically-trained wife (of an electronic engineer, however) and think that the word "envious" should be exchanged for the word "proud." I am proud of Dr. Abbott and also of Dr. Helen R. Belyea (p. 27, same issue) and all other women who make notable contributions to the field of geology.

Sincerely,

CAROL MEARTZ WILSON
Iowa City, Iowa

DEAR EDITOR:

The time has come for the AGI or some other organization of geologists to set up a committee on ethics to formulate and enforce a code of ethics. Unethical conduct, whether in the academic field or in

private industry, should not be tolerated if we wish to maintain the respect of our students and of the public for our profession.

Yours truly,

VICTOR COLOMBINI
Ruston, La.

EDITOR'S NOTE: The AAPG and SEEG have and are studying professional ethics. The AGI Committee on Professional Standards headed by B. W. Beebe is concerned with this and other problems.

DEAR EDITOR:

Thank you for your letter concerning my participation in the Duluth Conference.

As I was reading the September issue of *GeoTimes*, it occurred to me that you might like to hear from one of the teachers who participated in the Duluth Conference.

From the point of view of a classroom teacher, I was impressed by the organization of the conference and the selection of geologists made by the steering committee. The geologists were sincerely interested in the problems related to teaching young people. They cooperated wholeheartedly with the teachers, and this made for a close knit, hard working group.

Before the conference started, I wondered if the geologists could realize the problems we teachers face. These problems are varied because of the lack of a central education office controlling all the schools. However, all schools have one big problem in common and that concerns what should go into a science curriculum. There are only so many hours in a day for education and there is much material to include.

Where does geology fit into this picture? We were not able to answer this question at the Duluth Conference, but we were able to work around it and thus achieve some of the objectives set up by the steering committee. By developing a resource book whereby individual teachers can select appropriate material will get more and better geology instruction into the schools.

Our local educational systems are too complex for changing them overnight. A system cannot be superimposed from above on the schools. The approach of the conference was to develop a "grass-roots" attack. As the right material is made available, teachers will begin to develop programs that others will want to copy. I hope that the AGI or some other interested agency will publicize these outstanding programs. If more teachers know about good teaching in other sections of the country, they will begin to incorporate similar teaching techniques in their school rooms.

The Duluth Conference was a nucleus for the "grass-roots" movement in geology. Now there must be a follow-up on the program and the use of the resource book. There must be adequate publicity in the educational literature of this and other good geology programs.

Personally, I gained respect for and appreciation of the work of geologists. This year I am studying at the University of New Mexico. My course work is mainly in geology, and I am working on the development of better geological demonstration devices for teachers in a course of independent study.

When I look back at our work during the six-week period, I am amazed at the impact the conference had on me, the teacher. Now I am better equipped to pass on the appreciation I received to others. Many hundreds of students should benefit from this short, but inspiring experience. Wouldn't it be great for our country, our youth, and the geology profession if hundreds of teachers could have a similar experience?

I hope the geological societies will keep working toward improving the training of public school teachers. I hope the "grass-roots" program started by the Duluth Conference will develop into a plant and finally flower in the schools across our nation.

Thank you for the opportunity to work closely with professional geologists. Keep up your leadership in geological education and the people of America will better understand the problems facing their future.

Sincerely,

ROLLAND B. BARTHOLOMEW

OUR SLIP IS SHOWING. In the September issue of *GeoTimes*, we announced the Bibliography Of Theses in Geology by John & Halka Chronic and others, 1958, Pruett Press, Boulder, Colorado. \$15.00. (*GeoTimes* volume IV, No. 2, p. 31). In this announcement a typographical error indicated that the report listed 1191 theses. The reference to the number of theses should have read 11,091.

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GEOLOGIST, Ground water, Ph.D. Research on ground-water geology, teach one course. Salary commensurate with training, experience, publications. Write: Carl C. Branson, Director, Oklahoma Geological Survey, University of Oklahoma, Norman, Oklahoma.

GEOLOGIST-EDITOR, Ph.D. desirable. Geologic investigation, writing and geologic editing. Ability to write and to edit essential. Salary open. Write to Carl C. Branson, Director, Oklahoma Geological Survey, University of Oklahoma, Norman, Oklahoma.

ORGANIC GEOCHEMIST, M.S. or Ph.D. Specialized in analysis of organic components of sediments and/or components of crude oils. Experience desirable. Research aimed at understanding source rocks for petroleum.

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FAMILIARITY with oil exploration procedures desirable. Individuals will be in charge of their research projects. Laboratory has X-ray diffraction, X-ray fluorescence, DTA, infrared spectrophotometer, electron microscope, etc. Send resume to Manager, Production and Exploration Research Laboratory, Cities Service Research & Development Co., Tulsa, Okla.

POSITIONS WANTED

BOX 481. RESEARCH PETROLEUM GEOLOGIST-STRATIGRAPHER, 30, M.S. Extensive experience in stratigraphers U.S. and Canada. Have utilized newer exploration tools: Entropy Lithofacies mapping, Gamma-Halo surveys, porosity maps, moment maps, etc. Desire position of responsibility in research or exploration. Executive ability.

BOX 611. ASSISTANT PROFESSOR, Ph.D. major university wishes to teach in college or university in more desirable area. 3 yrs. teaching and 6 yrs. varied industrial experience. Primarily interested marine geology, paleontology, sedimentation, mineralogy. Active researcher, member prof. societies. Resume on request.

BOX 612. MUSICIAN and composer; full professor; major university; Yale graduate; 13 yrs. teaching experience; former violinist in internationally famous string quartet; Guggenheim Fellow; married; 2 children; wishes to teach in college or university in more desirable area; amateur geologist; would appreciate your bringing this ad to the attention of your Music Department. Resume on request.

GEOCHEMIST, 43, Ph.D. (London), Head of Dept., is due for sabbatical leave any time from Jan. 1960 onwards, requires post of visiting professor or fundamental research in petroleum or mining industry in N. America or England. Several major publications and further works projected, aiming of opening up new orientations, such as, metamorphism of carbonaceous phase, certain geochemical aspects of hydrothermal, fumarolic and evaporite deposits, conversion mechanism of allotropic modifications; co-author of "Organic Geochemistry" to be published by Pergamon Press. Experienced lecturer, particularly in geochemistry and economic geology. Contact Prof. Dr. G. Mueller, Depto. de Geologia, Cas. 53-C, Universidad, Concepcion, Chile.

BOX 630. GEOPHYSICIST, B.S. in geology, 11 years seismic experience including 4 years party chief and 3 years review work. Presently employed. Wants responsible job requiring both administrative and technical ability. Will go anywhere. Rocky Mountain area preferred.

BOX 637. GEOLOGICAL ENGINEER, M.S., 25, single, 3 yrs. experience as instrument operator and computer with seismic crew, now desires to become established in mineral exploration field. Thesis experience in photogeology. Foreign positions acceptable.

BOX 639. GEOLOGIST-GEOPHYSICIST, 35, B.S., Geology. 4½ years experience in Gulf Coast, Rocky Mt. East and West Texas with major oil company. All phases of exploration, seismic reflection interpretation, administration, and supervision. Desires position. Presently employed.

BOX 640. PETROLOGIST, 38, Ph.D. '52.

BOX 641. PETROGRAPHER-MINERALOGIST, M.S. from eastern university. Experienced in thin section and mineral fragment identification. Desires employment in petrographic work.

BOX 646. GEOLOGIST, broad exploratory background in the Four Corners, Panhandle and West Texas. Eight years experience includes subsurface, administration and seismograph. Some field and well work. Desires more responsibility.

BOX 647. GEOLOGIST, Ph.D. '34, married. Desires permanent teaching position in small to moderate size school and town, preferably in south or west. Broad geological background in teaching and research, especially in sedimentary rocks, principles of stratigraphy, petroleum geology, and mineralogy. 2½ years experience with major oil company.

BOX 651. GEOLOGIST, M.S., 26, family, desires permanent position. 3 season iron ore, base metals exploration in U.S., Canada. Military service in photogrammetry. Teaching experience in engineering geol., field geol., geophysics, mineralogy. Currently employed; available Nov. 15. Resume and references on request.

BOX 652. PETROLOGIST-MINERALOGIST, Ph.D., 31. Desires teaching-research position preferably in U.S. Principal fields: petrology, mineralogy, structural geology, geochemistry. Experience: 3 yrs. U.S.G.S., 3½ yrs. foreign geol. survey, ¼ yr. teaching at U.S. univ. U.S. citizen. Resume and reprints on request. Available Sept. 1960.

BOX 653. GEOLOGIST, Ph.D. 7 yrs. field experience in U.S. and Norway, some teaching experience in U.S. Numerous publications, U.S. and foreign journals. University position with graduate and advanced undergraduate teaching in petrology, mineralogy, crystal chemistry, and geochemistry desired. Opportunity for research essential. Now abroad. Available after Int. Geol. Congress, 1960.

POSITIONS WANTED—Continued

BOX 654. PALEONTOLOGIST, Ph.D., 28, four years university teaching experience in physical, historical, paleontology, geomorphology and glacial geology, Assistant Professor. Eight field seasons with major oil company and Geological Survey mapping surface structure in Rocky Mountains. Primary research interests are Paleozoic invertebrates and history of geology. Desires teaching or research position. Resume on request.

BOX 655. GEOLOGIST, Ph.D., 35, on sabbatical leave beginning February or June, 1960. Available for project work of any type, preferably foreign. Broad scientific background and diversified practical experience, especially within the mineral industry. Works well with people and enjoys all phases of the profession.

BOX 656. MINING GEOLOGIST-PETROGRAPHER, M.S. (Geol.), 27, family, 2 years research petrographer for major company; field investigation and mapping experience. Desires position with mining concern in western U.S.A., Canada, or Alaska offering exploration work. Employed; available during 1960 upon reasonable notice.

BOX 657. HARDROCK GEOLOGIST, Ph.D., 10 years varied experience with large mining corporation seeks position with diversified interests and permanent base of operations. At present resident in South Africa. Veteran. Late thirties. Family. Employed.

BOX 658. RETIRING DEPARTMENT CHAIRMAN with 30 years of successful teaching in eastern men's college is interested in 1 semester or 1 year appointments beginning September 1960 as visiting professor, or lecturer. Especially interested in courses in regional geomorphology and geology of U.S. and history of geological science.

BOX 659. GEOLOGIST, B.S., M.S., 29, vet., single. One year experience in Venezuela and some teaching experience. Would like a teaching or research position in a college offering studies toward a Ph.D. Main interest, sedimentation and stratigraphy.

BOX 660. ASSISTANT PROFESSOR, Ph.D., desires change. Presently at small midwest university. 7 yrs. teaching experience. Also 5 yrs. various industrial consulting and state survey experience. Desire more active and progressive department. Location midwest or west. Principal fields: geomorphology, paleozoic stratigraphy, non-metallic economic. Publications, member of professional societies. Additional information upon request.

GEOLOGIST, B.A., 25, single. Desires information concerning job possibilities upon discharge from service in mid-1960. Navy trained in SCUBA, deep sea diving and explosive work. LTJG Frank J. Shiner, Explosive Ordnance Disposal Unit One, FPO, San Francisco, Calif.

BOX 661. GEOLOGIST, B.S., 24, married, ends 2 year military obligation in March 1960. Desires domestic or foreign position. Resume on request.

BOX 662. GEOLOGIST, Ph.D., 33, family, 7 years practical experience (U.S. and foreign) seeks career in teaching. Principal interests: stratigraphy and historical geology, not restricted to North America.

BOX 663. GEOMORPHOLOGIST-GLACIAL GEOLOGIST, Ph.D., 36, desires teaching position in midwestern or northeastern college with graduate program, or undergraduate program with research encouraged. In addition, can teach ground water and structural geology. Four years with Ground Water Branch, USGS, five years in teaching. Publications. Resume on request.

BOX 664. GEOLOGICAL ENGINEER; graduate Colorado School of Mines, 38, single, desires uranium prospecting post or surface geology assignment, 10 years petroleum and uranium experience, surface, subsurface, wells, and coring.

GEOLOGIST-PILOT, M.S., in Dec. 1959, 25, family, veteran, 15 mo. part-time experience with State Survey. Have mapped sedimentary and metamorphic areas. 1 yr. experience supervising Photo Intelligence team in USAF. Have commercial pilot's license with multi-engine and instrument ratings. Domestic or foreign. James Wm. Smith, 1524 Rd., N.E., Atlanta 6, Georgia.

BOX 665. PALEONTOLOGIST, Ph.D., 32, five years teaching experience. Specialties geochemistry and paleoecology but have taught courses in many other areas. Desires teaching position with opportunity for research starting Sept. 1960.

BOX 666. GEOLOGIST, Ph.D. expected 1960, 27, single. Desires teaching and research position in university in sedimentary petrology, stratigraphy and sedimentation commencing with the fall term in 1960. Geological experience includes 6 summers mapping and research in Canada and 1 year in midcontinent. Teaching experience of 3 years at elementary and senior course level.

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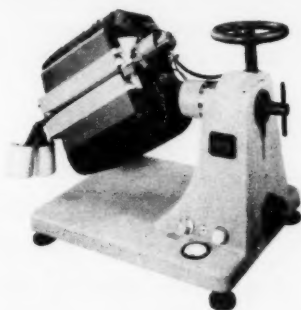
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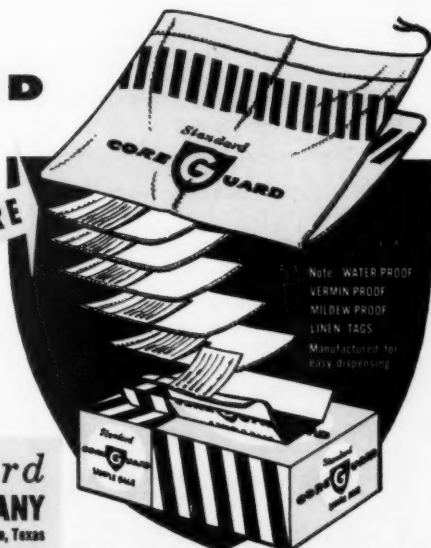
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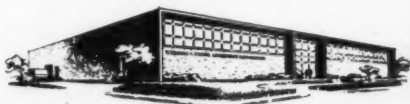
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